

'83-
'84

UNIVERSITY
OF LOWELL
CONTINUING
EDUCATION

Bulletin of Undergraduate Studies



UNIVERSITY OF LOWELL

Continuing Education

Evening Calendar

OFFICE: Lowell Level, Cumnock Hall

North Campus

First Semester (Sept. 1983)

August 29, 30, 31; September 1, 6:30-8:00 p.m. Registration
Monday through Thursday
September 6, Tuesday Classes begin
October 10, Monday Columbus Day Holiday
October 28, Friday Withdrawal Deadline (W notation)
November 11, Friday Veteran's Day
November 24, Thursday Thanksgiving Recess
December 20, Tuesday End of First Semester

Second Semester (Jan. 1984)

January 9, 10, 11, 12; 6:30-8:00 p.m. Registration
Monday through Thursday
January 16, Monday Martin Luther King, Jr. Birthday
January 17, Tuesday Classes begin
February 20, Monday Washington's Birthday
March 9, Friday Withdrawal Deadline (W notation)
April 16, Monday Patriots' Day Holiday
April 30, Monday End of Second Semester

SUMMER SESSION (May 1984)

Dates will be available in the Summer Evening Bulletin (April 1984)

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Bulletin of Undergraduate Studies

Published by the University of Lowell, 1 University Avenue, Lowell, Massachusetts 01854.

Each undergraduate is expected to be familiar with the contents of this publication.

The rules and regulations published in this bulletin were in effect at the beginning of the 1983-84 academic year and are subject to change through established procedures of the University. Changes in academic rules and regulations are effective at the beginning of the academic year following their adoption. Administrative regulations, including tuition and fee rates, are subject to change without advanced notice and are effective immediately upon adoption should authorities responsible for the development of such policies determine immediate implementation to be necessary. Listings of course offerings are subject to change by concerned departments and University administrators in the event that unforeseen faculty changes have taken place or

insufficient numbers of students have subscribed to course offerings. The official schedule of course offerings for each semester is provided in the Schedule of Classes, which is published biannually by the Evening School.

The University of Lowell is an Equal Opportunity/Affirmative Action University and does not discriminate in employment or access to programs or services on the basis of race, sex, color, national origin, religion, handicap or veteran's status, and is in compliance with Title IX of the Education Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973. Any inquiries and/or grievances may be referred to the Affirmative Action Officer, the Title IX Coordinator, the Handicapped Coordinator and/or to the Director, Office of Civil Rights, U.S. Department of Health, Education and Welfare, Washington, D.C.



Table of Contents

Academic Calendar	inside covers	Nursing	50
Continuing Education Administration	3	Civil Engineering Technology	52
General Information	4	Electronic Engineering Technology	54
Student Services	6	Mechanical Engineering Technology	56
General Policies	10	Industrial Technology - Manufacturing Option	58
Registration Information	12	Industrial Technology - Water and Waste Option	60
Tuition and Fees	14	Industrial Technology - Plastics Option	62
Admission and Degree Program Matriculation Information	15	Liberal Arts	64
University Requirements for Baccalaureate Studies	16	Course Descriptions	
University Requirements for Associate Studies	17	Accounting	65
Grading Information	18	Economics	66
Academic Standing	20	Banking	67
Graduation Information	23	Management	69
Engineering Technology Curricula	24	Chemistry	71
Course Equivalency Procedures	25	Science	73
Major Programs		Mathematics	75
Accounting (new)	26	Computer Science	80
Banking (new)	28	Civil Engineering Technology	83
Management (new)	30	Electronic Engineering Technology	85
Accounting (old)	32	Mechanical Engineering Technology	90
Banking (old)	34	Industrial Technology	93
Management (old)	36	Plastics	98
Information Systems	38	Clinical Laboratory Sciences	100
Public Service (Administration of Criminal Justice)	40	Nursing	101
Applied Chemistry	44	Criminal Justice	102
Applied Mathematics - Computer Science	46	Behavioral and Social Sciences (Area I)	104
Applied Mathematics	48	Fine Arts and the Humanities (Area II)	110
		Faculty - Senior Lecturers	114
		Directions to the University	119

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Continuing Education

Director of Continuing Education Ernest P. James, B.T.C., M.S.
Associate Director of Continuing Education David H. Pfister, B.S., M.S., P.E.
Assistant Director of Continuing Education Dirk Messelaar, B.A., Ed.M., Ed.D.

STAFF ASSISTANTS

Michelle Fournier
Andrea Barry Letizia, B.A.
Elizabeth Saucier

BUSINESS OFFICE

Director of Accounts Receivable, Douglas Laterowicz, B.S. in B.A., M.S.
Accountant Cynthia Skopic, B.A.

STAFF

Pauline S. Lessard
Dorothy Pagonis
Pauline Allard

PROGRAM COORDINATORS

Accounting, Banking, Management Santo J. Pullara, B.S., M.B.A.,
J.D., Ph.D.
Chemistry Philip S. Lamprey, B.S., Ph.D.
Civil Engineering Technology William E. Haskell, Jr., B.S., M.S.,
Ph.D., P.E., R.L.S.
Computer Science/Information Systems Ann Marie Hurley, B.S., M.S.
Electronic Engineering Technology J. Robert Lemieux, B.S., M.S.
Liberal Arts Donald R. Berry, A.B., M.A.
Industrial Technology David A. Colling, Sc.D., P.E.
Mathematics Alan W. Doerr, B.A., M.A.
Mechanical Engineering Technology Frederick B. Bischoff,
B.S., M.S., P.E.
Nursing Norma McQuaid, B.S., M.S.
Public Service Eva Buzawa, B.A., M.S., Ph.D.

Secretarial Staff

Carmen Elie
Irene Ferreira
Aline Grimard
Marguerite McGarry

Jolene Newell
Judith Patterson
Pamela Provencal

Lisa Rousseau
Diana Shapiro
Diane West
Lorraine Woods

General Information

History and Aims

The University of Lowell welcomes your interest as a prospective student. While a new school by virtue of 1973 Massachusetts legislation, the University of Lowell is actually a merger of two long-established educational institutions - Lowell State College and Lowell Technological Institute. These two components of the University represent a 161 year contribution to higher education dating back to the 1890's. Administration, faculty and resources of the two co-educational schools are now combined in the University of Lowell, an institution comprising seven colleges, a graduate school and continuing education facilities.

The aim of Continuing Education (which includes the Evening School) of the University of Lowell is to provide sound educational programs at both the graduate and undergraduate levels so that a student's years will be characterized by the growth of a mature and discerning mind, and the attainment of professional competence in a chosen field of concentration. Above all, Continuing Education seeks to prepare its students to be effective participants in the large community, and thus encourages the development of an awareness of the relations between the intellectual and the technical skills mastered in the classroom and the society in which we live. Students, it is hoped, will gain here a spirit of free inquiry and a dedication to the service of society.

Facilities of the University

The 100 acre University of Lowell campus is divided into North and South campuses by the historic Pawtucket Falls of the Merrimack River. The buildings - most of which have been erected in the last 15 years - represent an investment of 100 million dollars.

Continuing Education

Continuing Education oversees all the education at the University other than full-time graduate and undergraduate programs. In operation day and night, twelve months of the year, Continuing Education offers both credit programs leading to a degree,

and non-credit courses, scheduled at times convenient for those in the community who seek to accommodate study at the University to their professional and domestic commitments. In addition to its full range of credit and non-credit offerings, Continuing Education's flexibility enables it to respond with a continually updated series of workshops and seminars to the professional advancement requirements of individuals and the immediate educative needs of industry.

Evening Division

The Evening Division operates the Evening School components of Continuing Education, which offers a broad spectrum of courses to satisfy the educational needs of people who are restricted to evening attendance. Many evening students are transfer students from community colleges and other post-secondary institutions and veterans. The Evening School is particularly sensitive to the needs of people who seek vocational and professional career development. Programs are tailored so that the sequence of academic work will coincide with, and contribute to, systematic job progress over a period of years.

Graduate School

The following Graduate school degree programs are offered through the Evening School:

Master of Science in:

Plastics

Computer Engineering

Electrical Engineering

Systems Engineering

Biological Sciences

Mathematics (with options in Computer Science, Mathematics for Teachers, Applied Mathematics and Statistics)

Master of Business Administration

The graduate courses offered in the evening are equivalent in every respect to those offered in the day to full-time graduate students.

For further information concerning graduate programs, please consult the Graduate School

Catalogue. All inquiries regarding graduate programs should be addressed to the Graduate School, University of Lowell, Lowell, MA. 01854

Accreditation and Professional Memberships

The University of Lowell is an accredited member of the New England Association of Schools and Colleges. Professional programs at the baccalaureate level are also accredited by the following national associations:

American Chemical Society

Accreditation Board for Engineering & Technology (Civil Engineering Technology, Mechanical Engineering Technology, Electronic Engineering Technology, Civil Engineering, Mechanical Engineering, Electrical Engineering, Chemical Engineering and Plastics Engineering.)

National Accrediting Agency for Clinical Laboratory Sciences

National Council for the Accreditation of Teacher Education

National Association of Schools of Music
National League for Nursing

Accreditation indicates that the University is recognized and approved by regional and national associations concerned with the quality of higher education and it assures that study undertaken here has transfer value to other accredited institutions of higher education. The University is also a member in good standing on the following associations of higher education:

American Association of Colleges for Teacher Education

American Council on Education

Association for State Colleges and Universities

College Entrance Examination Board

National Association of Summer Sessions

National University Extension Association

New England Board of Higher Education

National League for Nursing



Student Services

Library

The University libraries, which consist of the Alumni-Lydon Library (North Campus) and the O'Leary Library (South Campus), have a seating capacity of 2,000. Present library holdings include over 305,740 books and periodicals and a large number of such non-print materials as audio recordings, video tapes, films, and microfilms. The O'Leary Library has holdings in the humanities, fine arts, education, and music, and houses the Educational Resources Information Center microfiche collection, 118 listening stations, and a collection of music scores. The Alumni-Lydon Library is rich in resources for science and business management fields. Special resources of the University libraries include rare books and artifacts. The University libraries provide interlibrary loan services and also function as a U.S. Government depository.

Library Regulations

New students should have their pictures taken for an identification card at the beginning of the academic year. This photo-identification card must be presented upon request for admission to the library facilities and whenever a student wishes to take materials from a library. A student's library privileges, including the right to study in library areas, may be revoked when library rules concerning appropriate conduct have been violated.

Students who retain regular circulating materials for three or more weeks beyond their authorized period of circulation, or who retain library materials after the beginning of the final examination period without explicit permission from the library staff shall forfeit their library privileges. Students who steal or maliciously deface library property forfeit their library privileges indefinitely. Reinstatement of library privileges may be granted only by the Dean of Library Sciences. Students who incur library fines, lose library materials, or damage library property must discharge their financial obligations to the University Library before the end of the semester in which such obligations have been incurred. Administrative dismissal from the Univer-

sity may be invoked when a student fails to comply, after due notice, with a direction to discharge library fines and obligations. Seniors who have not discharged their financial indebtedness to the University Library by the end of May will not be permitted to graduate until such time as they have discharged their indebtedness and their records have been cleared by the Business Office.

Library Fines

Library fines are levied according to the following schedule:

1. Overdue books and phonograph records:
 - a. Regular circulating books and phonograph records - \$.10 a day per book or record;
 - b. Reserve material - \$.25 per ½ hour to a maximum of \$2.00 per book or record for the first day and \$1.00 per book or record for each succeeding class day overdue item;
 - c. Recalled material - \$1.00 per day for each book or record to a maximum of \$10.00 per book or record.
2. Lost Library materials:
 - a. Replacement cost of lost material plus
 - b. Processing fee of \$3.00 per lost item.
3. Accumulated fines:
 - a. Students who have lost library materials and fail to notify library authorities of their loss within two weeks of the mailing of official notification of delinquency must pay accumulated fines up to \$10.00 per book or record plus the replacement and processing fees levied for each lost item.

Circulation Regulations

Books may be borrowed for a period of two to four weeks and may be renewed unless they have been requested by other students or by faculty members.



Library Hours

Monday	8:00 am - 8:00 pm
Tuesday - Thursday	8:00 am - 10:00 pm
Friday	8:00 am - 5:00 pm
Saturday	Closed
Sunday	2:00 pm - 10:00 pm

Holiday hours for each of the Libraries will be posted. During vacations, the Libraries will be open from 8:00 am to 5:00 pm, but will be closed on weekends. Libraries open on the day before classes resume.

Career Development

Career Development is an ongoing process evolving from one's own personal history, feelings and experiences. It involves evaluating your abilities, interests, values and preferred life-styles; then using this information to develop satisfying, realistic and flexible education, work, and leisure plans.

If you are experiencing a degree of uncertainty, anxiety or confusion around a choice of major, career goals, mid-career changes or re-entering the job market, then you may benefit from Career Development Counseling. Entering, first and second year students and anyone having questions about careers or considering a career change may schedule an appointment to discuss their career concerns.

Specific Career Development Services are available through the Continuing Education Office. The following are available by appointment:

Career Development Counseling

You may schedule a one-session Career Development Consultation appointment with a counselor or a three-session Career Counseling and testing package. Call the Continuing Education Office to schedule your appointment.

Career Development Planning Workshop

A workshop designed to introduce participants to life/work planning and to review some decision-making skills involved in planning a satisfying and rewarding balance between leisure, education, and

work. A vocational interest inventory will be administered and participants will have an opportunity to identify marketable skills. The workshop will be six sessions. Register with the Continuing Education Office and once a group is formed, you will be contacted.

Testing

A computer-scored vocational interest inventory is available as part of the three session career counseling and testing package. Testing is not designed to provide automatic answers for your career direction. It will, however, provide a tool for your career development. The Career Development Counselor will interpret your test results and develop a more comprehensive approach to your career development.

Career Development Resource Library

The Career Development Resource Library has a variety of career and college major reference materials, government publications, selected directories and career newsletters available for all students exploring career change or deciding on a major. Call Continuing Education for an appointment.

Please note that all services are confidential and free of charge for all Continuing Education students. Also, appointments for all career development services listed should be scheduled with the Career Development Specialist through the Continuing Education Office, located in the lower level, Cum-nock Hall, North Campus, 452-5000, extension 2221.

Career Planning and Placement

During each semester, a representative of the Placement Office is in residence one evening a week at the Continuing Education Office. Evening stu-

dents are able to get expert counseling in career planning or change, in resume preparation and the latest interviewing techniques, as well as up-to-the-minute information on the scheduling of campus recruiting by business and industry.

Some of the services provided by the Career Planning and Placement Office are: career planning information, career research materials, resume preparation workshops, interview/job marketing workshops, career/professional days, company pre-interview meetings, and on-campus recruiting interviews.

The focus of Career Planning and Placement Services is upon the student not only immediately before or after graduation, but also during the earlier undergraduate years in the quest for self understanding appraisal of interests and abilities, and efforts to determine vocational objectives which are most meaningful and satisfying.

It is the purpose of career counseling and placement referral to assist students and graduates in these endeavors, functioning as an integral part of the educative process.

Career Planning and Placement has the responsibility to develop and maintain communication channels among students, faculty, educational administrators, education institutions, and employers so that their various needs and interests can be properly interpreted and implemented.

The Director of the Placement Office is available without appointment. Individual consultation throughout the academic year is always welcomed. The Career Planning and Placement Office is on the first floor of Southwick Hall, North Campus.



General Policies

Policy Changes

The University of Lowell reserves the right to change requirements, subjects, courses, regulations and other policies stated in this bulletin without formal notice. Continuing Education reserves the right to close a course registration, cancel a course, alter the schedule time or change the scheduled night without formal notice.

Continuing Education and Evening School classes will not be cancelled for reasons of weather. The difficulty of notifying all students and instructors individually in sufficient time makes this policy necessary. The University does reserve the right to cancel classes in any case of emergency.

Special Students

Students who wish to register for a single course in the undergraduate degree programs may do so provided they have the necessary prerequisites. Tuition will be charged at the regular rate, and credit will be awarded for the successful completion of such courses.

Attendance

Students must attend 80 percent of all classes held in their courses. More than three unexplained absences may cause a student to be dropped from the rolls with a grade of "F" in the course. Examinations or other work missed by absence may, at the option of the instructor, be made up or failed.

Audit

Courses may be taken for Audit only as a review for courses previously taken and passed. Permission of the Associate Director must be obtained in order to take an audit course.

Federal Benefits

All veterans entitled to educational benefits under Federal law should secure a Certificate of Eligibility from the Veterans Administration. Application

forms may be obtained from the Evening School Office or the local V.A. Office. All veterans must submit a high school transcript and a transcript of all post-secondary education before registering in any program.

Student Responsibility

To be admitted to, and enrolled in a scheduled class, students must present to the instructor a validated class card which is received from the Continuing Education Business Office upon payment of fees.

The identification card issued by the University must be carried by the student on his person while attending school.

It is the responsibility of the student to become familiar with the scholastic regulations in regard to attendance, scholastic standards, withdrawals, etc., as stated in this bulletin. An administrative assistant is assigned to the Evening School Office from 6:30 - 10:00 p.m. throughout the school year to advise students about these matters.

Students must pay for any breakage or damage of school equipment that they may cause, provided that such breakage does not occur while the student is under direct supervision of his instructor.

In some instruction, the student is required by law to wear safety glasses or other safety devices. The instructor of such classes will inform students of their obligation to obtain and wear the necessary safety protection.

Administrative Dismissal

A student may be administratively dismissed from the University through cancellation of registration for due cause, through expulsion for academic dishonesty, and through disciplinary procedures for violations of good conduct.

Non-Academic Dismissal

Administrative dismissal may be invoked when a student fails to comply, after due notice, with an administrative requirement of the University. Ad-

ministrative dismissal is noted on the permanent report card by the symbol "Y", for each course carried by the dismissed student. Reinstatement may be made only by application for readmission with Continuing Education and only after readmission contingencies have been met. Examples of conditions which may justify administrative dismissal include:

Forgery or fraudulent use of University records, documents or forms and non-payment of official University fiscal obligations.

Academic Expulsion

Students who have evidenced academic dishonesty including cheating and plagiarism, may be administratively expelled from the University. University departments and colleges have established procedures for adjudicating charges of academic dishonesty and for establishing penalties up to and including administrative dismissal. Students expelled from the University for academic dishonesty shall fail those courses in which the dishonesty has taken place.

Class Schedule

Classes in the Evening School undergraduate degree programs are scheduled from 7:00 to 10:00 p.m. on Monday, Tuesday, Wednesday, Thursday, and Friday evenings as listed in the schedule on the inside back cover of this bulletin.

Other hours are sometimes scheduled in certain courses, in which case, the hours are listed in the schedule of classes published each semester.

Size of Class

Those classes which do not register a minimum of 15 students may be cancelled. The number of enrollments during preliminary registration is an important factor in determining the schedule of courses; thus to ensure the scheduling of desired courses students are urged to participate in the preliminary registration.

Books and Supplies

Students must provide their own books, paper, drawing materials, and other supplies. Required texts and supplies are sold by the University's bookstores at scheduled times in the evening. The bookstore schedule is posted on the Evening School bulletin board, ground floor, Cumnock Hall.



Registration Information

Preliminary Registration

A preliminary registration process for new applicants and previously enrolled students enables the Evening School to schedule classes more efficiently, and to provide for adequate instruction in courses which would otherwise be oversubscribed. The process also allows the student to stipulate a preferred day and hour for multi-section courses, and expedites the formal registration process which is held at a later date. Since no payment of fees is involved in preliminary registration, **students are alerted that they are not formally registered until all fees have been paid in full during the scheduled formal registration period.**

Scheduled Registration

Students register by completing the necessary forms (a process expedited by participation in preliminary registration), and paying the required fees before commencement of classes. Registration is held on the dates indicated in the calendar (inside front cover). During the registration period the Business Office is open from 6:00 to 8:30 p.m. in addition to regular daytime hours. **A student is not officially registered until the tuition and all other fees have been paid and the class cards have been validated by the Continuing Education Business Office.** These cards are required for admission to class. Students must also obtain an identification card during the registration period.

Late Registration

Late registration is permitted until the end of the second week of classes. A late registration fee of \$10.00 will be assessed in addition to regular tuition charges and other fees. No student will be admitted to a class after the third meeting. **No class changes are accepted after the end of the second week of classes.**

Summer Program

Selected courses are offered during the summer. The subjects offered depend upon student demand

and may vary from year to year. For each course passed during the summer, students receive full credit on the same basis as for work done during the fall or spring semesters. Costs and other information are available at the Evening School Office before the start of the summer session.

Program Planning

An administrative assistant is available at the Evening School Office through the school year while classes are in session. Assistance in program planning is also available during the scheduled registration period each semester. However, **students are strongly advised to seek counseling during the school year so that they may participate in preliminary registration.**

Transfer Credit

If a student wishes to request transfer credit he must submit an official transcript of grades for work done elsewhere, together with a catalogue or other description of the courses taken. Transcripts from other schools must be received before a student completes his second semester of work at the University. No request for transfer credit will be considered until all the required material has been submitted. Credit will be allowed for work completed at accredited institutions (subject to the limitations listed below) which is deemed equivalent to University of Lowell instruction, and for which the student has received a grade equivalent to a "C" or higher by University of Lowell standards.

Grades of transferred courses, however, will not be computed in a student's cumulative rating at the University of Lowell. Transfer subjects will be recorded with the notation "Cr" which designates that credit only has been granted.

Transfer credit will not be granted in the following instances:

1. For work completed at non-public institutions which are not accredited by the major accrediting associations.
2. For work completed through extension or adult-enrichment programs.

3. For work which was completed more than ten years prior to the date of application for transfer credit to the University of Lowell.
4. For work which was not acceptable to the transfer institution for its own associate or baccalaureate program.

However, if the student is able to demonstrate his competence in the subjects for which transfer credit is denied by passing special departmental examinations or through the CLEP program, credit may be awarded by the University.

The University of Lowell has affirmed its intention to maintain flexibility in the transfer of qualified students of the Commonwealth of Massachusetts. For the implementation of this objective, the University of Lowell has subscribed to the Massachusetts Transfer Compact.

University of Lowell Day School students who wish to transfer to the Evening School must follow University regulations as noted in the General Academic Rules of the University (Day School). Students with satisfactory academic standing and students who have been placed on warning may petition for intercollegiate transfer to the Evening School.

Day School Classes

Students who are matriculating for associate or baccalaureate degrees in the Evening School of Continuing Education may be permitted to pursue specifically authorized day courses. Such students must secure the written approval of their program coordinators for all projected courses prior to filing an application with the Office of University Admissions. Full notation of all approved courses (including those which have been failed) is made upon the permanent record card of Continuing Education students, and the grades earned are included in the cumulative grade point average.

Off Campus Study

Individuals who have been admitted to the Evening School may be permitted to apply off-campus

courses to their degree programs when they comply with established procedures. Off-campus courses may be taken in accredited institutions only and ordinarily should be taken at baccalaureate colleges or at universities. Permission to pursue off-campus courses in accredited associate degree institutions may be granted only for courses which are to be presented for lower-division requirements of University of Lowell curricula. All off-campus courses must be taken under the regular grading system and may not be taken on a "pass-fail" or "pass-no record" basis. Students must request permission to take off-campus subjects by completion of a petition form and must obtain written approval from their curriculum coordinator.



Tuition and Fee Information

Tuition /Academic Service Fee

Tuition/Academic Service Fee charges are \$40.00 per credit hour for a lecture course, and \$40.00 per contact hour for a laboratory course or for a course which meets for more hours per week than it carries credits. Of the above amount, \$2.00 per credit/contact hour is for the Academic Service Fee. Tuition charges for Audit courses are \$15.00 per credit/contact hour.

Registration Fee and Insurance Fund

A payment of \$10.00 per semester in addition to tuition and other charges is required of all students for registration and for compulsory insurance. This payment is not refundable.

The compulsory fee, approved by the Board of Trustees of the University of Lowell, provides an accidental medical insurance plan to cover registered students in Continuing Education while on the premises of the University for scheduled instruction, and while engaged in any supervised activity sponsored by Continuing Education. Payment will be made for medical expenses from such accidents up to a maximum of \$1,000.00. Claim forms can be obtained from the Continuing Education Business Office and submitted to the doctor or hospital, if possible, at the time of treatment. Benefits are paid directly to the medical facility. All accidents should be reported to the Security Office as soon as possible.

Late Registration Fee

A late registration fee of \$10.00 is charged any student who registers after the regular registration date as listed in the calendar on the inside cover of this bulletin. This fee is assessed in addition to usual registration and insurance fees. This payment is not refundable.

Laboratory Fee

A \$25.00 laboratory fee is charged any student who registers for a laboratory course. This payment is not refundable.

Tuition Refund

Any eligibility for tuition refund is based on the academic calendar not class attendance and is prorated as follows. Fees are not refunded unless Continuing Education is responsible for cancellations.

Withdrawal before 1st meeting	100%
After the 1st but before the 2nd	90%
After the 2nd but before the 3rd	50%
After the 3rd	no refund

The refunding process normally requires at least a period of 4-6 weeks from the time the refund is submitted. Students desiring refunds must file an application form obtainable at the Evening School Office.

Clinical Supervision Fee

This \$12.00 fee will be levied upon those students who are placed in clinical agencies, including school, to help defray the cost of supervision by University faculty members and the coordination expenses which are incurred by personnel of co-operating agencies and school. The fee will be levied for each clinical experience for which a student has contracted.

Payment of Bills

A student in debt to the University at the end of any semester or summer session for fees or other charges is not permitted to register again at the University until his or her indebtedness has been discharged. Such a student who has been preregistered shall have his or her registration cancelled without further notice if payment of previous indebtedness has not been made prior to the beginning of classes for the following semester. Grade reports and transcripts of students will not be released unless all indebtedness has been discharged.

Admission and Degree Program Matriculation Information

General Requirements

Entrance to all undergraduate degree programs offered by the Evening School requires graduation from a recognized high school or equivalent such as a Massachusetts High School Equivalency Certificate. Each student must submit his high school transcript or equivalency certificate prior to matriculation. In addition, students desiring to enter degree programs must have the following qualifications at the time of application:

for Business and Public Service Programs — Two years of mathematics of which one year must be algebra.

for Technology and Science Programs — A minimum of two years of mathematics with one year of algebra and one year of plane geometry.

for the Nursing Program — Licensure as a registered nurse. It is also recommended, but not required, that applicants have two years of mathematics, including one year of algebra. Students not possessing this background in mathematics should seek guidance before registering for the computer and statistics courses.

Matriculation in a Degree Program

In order to be matriculated in a degree program it is necessary (in addition to satisfying the entrance requirements) for the students to have demonstrated ability to participate in college level courses. Thus, matriculation in a degree program is deferred until the student satisfactorily completes a minimum of 18 credits in the required subjects. (One credit is one class hour per week per semester.) A student who has done so must request matriculation to a degree program by completing the necessary form. Further requirements for matriculation in the Nursing Program are as follows:

Matriculation and Retention in the Nursing Program

Irrespective of the classification policies of the University, nursing students shall not be admitted to the professional nursing courses unless they have

satisfactorily completed all courses which are specified by the nursing program for the first seven semesters, and they have achieved a cumulative grade point average of 2.5 or better for all courses, as well as, a cumulative grade point average of 2.5 or better in the required sciences.

To qualify for continued matriculation in the Nursing Program, all students must maintain an ongoing cumulative average of 2.5 or better, and a 2.5 or better for the professional courses attempted in the major. Students who fail to satisfy these requirements will be dropped from the program. All students in the Nursing Program must demonstrate a state of emotional and physical health which will enable them to provide safe, competent practice in nursing.

In special cases, at the request of the Professional Review Committee, an individual may be required to present statements of physical or mental health, from appropriate physicians or psychiatrists who are fully licensed by the Commonwealth of Massachusetts.

On the basis of a review of such statements, the Professional Review Committee may recommend to the chairperson of the Nursing Department that the individual be denied admission to the Nursing Program, or that his or her enrollment in this program be terminated.

The registered nurse student must pass departmental equivalency examinations which include a clinical component for a total of twenty four credits with a C+ or better in order to continue to the fifth year of the evening program. Questions regarding the nursing program should be directed to the program coordinator.

Each registered nurse student must provide proof of purchase of professional liability insurance in the amount of one million/one million aggregate in order to participate in the senior level courses of the nursing curriculum.

In addition each registered nurse student must provide evidence of a Tuberculosis skin test or X-ray report, a report of a complete physical examination, and a current Rubella immunization. Reports must be submitted to the Continuing Education Coordinator of the Nursing Program by September first of each year.

University Requirements for Baccalaureate Studies

All baccalaureate candidates are required to obtain 2.00 ("C") cumulative averages in their total courses of study, to present a minimum of 120 semester hours of course credits to fulfill the residency requirement of one year of fulltime study, to conform to the general regulations and requirements of the University, to satisfy the regulations and academic standards of the colleges which exercise jurisdiction over the degrees for which they are matriculating, to satisfy the curriculum requirements established by the departments or programs in which they are majoring, and to complete the following core requirements of thirty-three (33) semester credits.

University Core Requirements

1. English Composition Requirement (six (6) semester credits.)

All students must pass a sequence of two courses totaling six semester credits in English Composition (normally to be taken the freshman year.)

2. Area Distribution Requirements (twenty seven (27) semester credits.)

All students must select and pass a minimum of nine courses and twenty seven semester credits outside their major departments in three basic areas of the liberal arts and sciences. A minimum of two courses and six semester credits must be presented in **each** of the three areas and an additional three courses and nine semester credits must be presented from **among** the three basic areas. In fulfilling the Area Distribution Requirements, students may not present more than three courses and nine semester credits from the offerings of any one department (except that they may not present more than two courses and six semester credits from the offerings of the English Department) and may not present more than four courses and twelve semester credits in any one distribution area.

AREA I: Behavioral and Social Sciences

Economics, Geography (non-laboratory courses), History, Political Science, Psychology and Sociology.

AREA II: Fine Arts and the Humanities

Art, English, Languages, Music and Philosophy.

AREA III: Mathematics and the Sciences

Astronomy, Biology, Chemistry, Earth Sciences (Geography laboratory courses, Geology, Meteorology), Mathematics and Physics.

Residency Requirements

In addition to satisfying specific course and achievement requirements, each baccalaureate candidate must complete at least 15 semester credits in regular course work within major departments of the University for each major which is presented for a degree. Each candidate for a baccalaureate degree must also satisfy one of the following residency requirements:

1. Complete not less than 90 semester credits at the University and complete the remainder of the prescribed courses of study at another accredited baccalaureate institution, earning not more than 36 semester credits at that institution;
2. Complete an associate degree under the provisions of the Massachusetts Transfer Compact in a Massachusetts Community College, earning not more than 60 semester credits, and the remainder in courses of the University, earning not less than 60 semester credits;
3. Complete up to the first two years in an accredited associate institution earning not more than 60 semester credits (with "C" grades or better), and the remaining years in courses of the University, earning not less than 60 semester credits. Individuals transferring from a Massachusetts Community College who have not completed the associate degree may receive recognition only for credits with grades of "C" or better; or
4. Complete up to the first three years of a baccalaureate program in an accredited four-year institution, earning not more than 90

semester credits, ("C" grades or better), and the remaining courses in the University, earning not less than 36 semester credits.

Except that all candidates for a baccalaureate must present a minimum of 36 semester credits of full-time study in University evening classes, the above cited residency requirements for University study may be satisfied through other than the attendance of evening classes; for example: established course-equivalency procedures, authorized day courses in the University and authorized courses at other accredited baccalaureate institutions.

Upon approval of the appropriate curriculum Coordinator, the course requirements of 15 credits with the major department and up to 15 credits of the minimum University residency requirements may be satisfied through completion of day courses of the University.

Additional Baccalaureate Degree

A student who has earned a baccalaureate degree at the University of Lowell or at another accredited baccalaureate institution may be admitted to the University to pursue an additional baccalaureate degree which is different from that previously conferred if (1) the major field of the previous is clearly distinct from that of the additional degree, (2) the work for the additional degree consists of not less than four semesters of residence, (3) the final 36 credits presented for the additional degree are in addition to and independent of any previous baccalaureate, and (4) a minimum of 15 credits is taken at the University in the major field which is presented for the additional degree. If any of the first three years of credit has been transferred from another institution, the candidate for the additional baccalaureate degree must earn a minimum of 36 semester credits of uninterrupted residence at the University.

University Requirements for Associate Studies

Students must meet all the requirements of the program as noted in the **Bulletin of Undergraduate Studies of Continuing Education**. In addition, each student must complete at least 9 semester credits in regular course work with his/her major department and must complete at least 24 semester credits in the Evening School of the University of Lowell.

Additional Associate Degree

A student may pursue an additional associate degree under the same regulations set forth for pursuing an additional baccalaureate degree except that the number of credits required are 24.

Grading Information

Grading System

The following qualitative letter grades are employed by the University to characterize the quality of a student's work in a course:

"A"	designates that the work done by the student is superior and is of the highest honors quality;	4
"AB"	designates that the work done by the student is less than superior but is completed with a level of distinction which is higher than the basic honors level;	3.5
"B"	designates that the work done by the student is of basic honors quality;	3
"BC"	designates that the work done by the student is less than honors quality but is better than satisfactory;	2.5
"C"	indicates satisfactory work which conforms to the general expectations of the University for baccalaureate study;	2
"CD"	indicates that the work done by the student is less than satisfactory and below graduation standards but is better than the minimum requirement for passing a course;	1.5
"D"	indicates work which meets the minimum requirement for passing a course;	1
"F"	designates course failure.	0

In addition to the above letter grades, the following symbols are also used to designate special enrollment provision or course status and do not affect the student's academic average:

"S"	designates satisfactory completion of a practicum experience course with a grade of "C" or higher;
"U"	indicates unsatisfactory performance in a practicum experience course with a final course grade of less than "C";
"I"	indicates a course which has not been completed;
"W"	designates official withdrawal from a course within the established deadline;
"X"	designates student withdrawal after the estab-

lished deadline for administratively approved reasons for an emergency or medical nature;

"Y" designates administrative dismissal for other than academic reasons;

"AU" designates that the student has registered for a course on an "audit" basis and has maintained an attendance record throughout the semester which is sufficient to warrant an official recognition of his course attendance.

Withdrawal

"W" is not an academic grade but a symbol designating **official** withdrawal from a course within the established deadline of the eighth (8) week of class of a semester. Official withdrawal is accomplished by filing a "Withdrawal Form" with the Evening School Office. A notation of "W" cannot be given for unofficial withdrawal from a course, or for unofficial withdrawal from the University. Accordingly, a student who registers for a course and is carried on an official class roster after the eighth week of a semester must be graded in terms of the completion of the instructor's total course requirements even though the student did not attend any class meeting, or unofficially left before the eighth week of the semester. A student who wishes to withdraw from a course after the deadline of the eighth week must submit a petition to the Evening School. An "X" will be given only when it can be demonstrated that extended illness or a critical personal emergency of an extended nature prevented the student from complying with official withdrawal procedures. Students receiving benefits from the Veterans Administration are not eligible for retroactive withdrawal from courses since the University is required to make official, and immediately report, any change of enrollment status for such students to the Veterans Administration.

Incomplete

An Incomplete ("I") is given at the discretion of the instructor; students should not take it for granted that they will receive an Incomplete without first consulting with the instructor. However, responsibil-

ity for completing all outstanding work rests entirely with the student. The Incomplete notation carries with it a reserve letter grade; if all outstanding work is not acceptably made up and submitted within a four-week period following the final examination, the "I" will automatically become whatever the instructor has designated as this reserve grade. If the work is satisfactorily completed within the designated time, the instructor will replace the "I" notation (and its reserve grade) with an appropriate letter grade. Outstanding work may be made up after the four week period, but arrangements for this make-up must be completed within the original four-week period and permission of the instructor must be obtained for the extension of time.

Repeated Course Work

Students must repeat and pass all **required** courses which they have failed. Any failed course which is a prerequisite for another must be repeated and passed before the student can take the advanced course.

Students may repeat a limited number of courses in which they received a grade of "F" and have the repeated grade substituted for the original grade in the computation of the cumulative grade-point average. Non-probationary students must repeat courses within 36 semester hours following their course failures. Although probationary students may invoke the grade substitution provision during their periods of probation, they may invoke the grade-substitution process upon removal from probation. Students entering as freshmen or transferring with less than 60 semester credits are permitted a maximum of 10 credits of course repetition for grade substitution; students transferring with 60 or more semester credits are permitted a maximum of 7 credits of course repetition for grade substitution, **both grades** will be used in determining the grade-point average. Students must designate by petition which courses are being repeated for the purpose of grade substitution **before** re-enrolling.

Prior to an initial determination of academic progress a student may not repeat courses for grade substitution.

Remedial Courses

Any course in a sequence of courses which is at a lower level than the required courses in the program will be considered a remedial course and is not acceptable as an elective in the program. Grades earned for these courses will not be calculated in the student's grade point average e.g., 42.100; 90.010; 90.111.



Academic Standing

Grade-Point Requirements

Each student is subject to the following grade-point requirements for the specified numbers of completed course hours. These grade-point averages are minimum University requirements; individual colleges or departments may establish higher standards.

Course Hours Completed*	Grade-Point Averages for Satisfactory Standing†	Grade-Point Averages for Academic Warning†	Grade-Point Averages for Academic Suspension†
12-30	1.500	1.400-1.499	1.399 or below
31-45	1.600	1.500-1.599	1.499 or below
46-60	1.700	1.600-1.699	1.599 or below
61-75	1.800	1.700-1.799	1.699 or below
76-90	1.900	1.800-1.899	1.799 or below
91-graduation	2.000	1.900-1.999	1.899 or below

*Included in "Course Hours Completed" are all course credits which have been granted (including credits awarded through transfer and challenge by examination, course credits which have been awarded with qualitative letter grades) and all hours of course work which have been failed with the qualitative letter grade of "F".

† Specified "Grade-Point Averages" are computed solely on the basis of those courses completed at the University of Lowell or through University auspices within policies governing authorized off-campus study which have been qualitatively evaluated with the following letter grades: "A", "AB", "B", "BC", "C", "CD", "D" and "F".

A student who has been placed on Academic Warning must reach Satisfactory Standing upon the completion of 15 additional hours of course work or be suspended from the University.

Academic Probation

A student who has been suspended from the University as a matriculating student in the Evening School is entitled to apply to the Office of Continuing Education for readmission as a probationary student in accordance with procedures enumerated under the admission policy heading "Probationary Readmission." Students who are readmitted on probation will receive a letter from the Academic Standards Committee of the Evening School* which specifies their probationary courses and the academic average which they must achieve during their designated probationary period in order to achieve satisfactory academic standing.

A student who achieves the required academic average during his or her probation is automatically reinstated as a student in satisfactory academic standing. A student whose academic average falls below the required average for his or her designated probationary period by no more than 0.10 may be granted an extension of the probationary period which will permit the completion of an additional 15 credits. Such extension of probation, if granted, will be made by the Academic Standards Committee of the Evening School* during the period between semesters. Students who are granted such extensions will be notified in writing prior to the beginning of classes for the following semester that they have been granted an additional probationary period to achieve satisfactory academic standing. Students who fail to achieve satisfactory academic standing and are not granted extensions of their probations by the Academic Standards Committee of the Evening School* and students who granted such extensions and fail to achieve satisfactory academic standing by the end of the designated period are permanently dismissed from the University and are subsequently barred from attending both day and evening courses.

Students who have been readmitted on probation may not invoke University regulations which govern course repetition for the purpose of deleting course grades from cumulative averages. † Nor may they withdraw from any course unless they withdraw from the University with permission of the Associate Director of Continuing Education for reasons of an emergency or medical nature. A probationary student who withdraws from any course without authorization of the Associate Director of Continuing Education cannot by definition satisfy the conditions of his or her probation and will be permanently dismissed from the University at the end of the

*Students seeking probationary readmission to Continuing Education programs which are under the direct academic control of University colleges and /or departments are reviewed by appropriate college committees rather than by the Academic Standards Committee of the Evening School.

† Following the attainment of satisfactory academic standing and removal from probation, a student who has failed a course during the two semesters preceding suspension and has repeated and passed such a course during his or her probationary period may retroactively invoke the provision which permits deletion of the course failure from the cumulative grade-point average.

current semester of enrollment.

Probationary students who receive course evaluations of "I" (incomplete) and who fail to make-up their work under the regulations of an "I" grade are advised that they may not qualify for extension of their probation, may not register for nor attend University courses (including summer courses), and may not receive authorization to pursue off-campus studies until such time as a final determination of their status has been made.

Accordingly, probationary students are advised that they should not delay completion of course work until the make-up deadline which has been established for students in satisfactory academic standing unless they wish to postpone resumption of their studies. Students who have received permission of the Associate Director of Continuing Education to extend their make-up period should understand that such authorized extension does not waive the requirement for a final determination of academic standing which is based upon grades for all probationary courses.

Probationary Readmission

A student who has been suspended from the University as a matriculating student in the Evening School is entitled to apply for readmission as a probationary student but may not initiate his or her probationary studies before an absence from the University for one semester. Application for such readmission to all programs of the Evening School is made through the Office of Continuing Education in accordance with prescribed procedures and must be received by April 1 for readmission decision during the Spring Semester and by November 1 for readmission decision during the Fall Semester. Petitions which have been received by the filing deadline of November 1 will be reviewed by the Standards Committee of the Evening School* during the Fall Semester and readmitted students will be permitted to initiate their probationary studies at the beginning of the Spring Semester. Similarly, petitions which have been received by the filing deadline of April 1 will be reviewed by the Academic Standards Committee of the Evening School* during the Spring

Semester and readmitted students will be permitted to initiate their probationary studies at the beginning of the Fall Semester. The Academic Standards Committee of the Evening School** may authorize the initiation of probationary studies during the summer school if such a request has been made by the applicant for probation.

Upon receipt of an application, the Office of Continuing Education will forward all readmission papers to the Academic Standards Committee of the Evening School.

In determining such requirements for probation, the Academic Standards Committee shall prescribe a sufficient number of courses (12 to 18 credits) which shall make the achievement of satisfactory academic standing reasonably possible during the designated probationary period. For complete information concerning probationary requirement, cf. "Academic Probation" under the section heading for **Undergraduate Academic Policies: Academic Standing.**

WARNING – Students who attend another institution while on suspension from the University must petition to have their courses accepted for transfer credit only after successful completion of the probationary period. Inasmuch as these courses would have been taken without permission of the curriculum coordinator, it is possible that the petition could be denied.

† † After securing recommendations from appropriate program coordinators and studying the previous academic record of the student, the Academic Standards Committee will lay down the requirements which the student must satisfy as a condition for his or her probation (specific courses to be taken, conference schedules with program coordinators), and any other special or general academic conditions which may be construed as necessary for the student's successful completion of his or her probationary studies.

**Students seeking probationary readmission to Continuing Education programs which are under the direct control of University colleges and/or departments are reviewed by appropriate college committees rather than the Academic Standards Committee of the Evening School.

† † Since program transfer is permitted only for students in satisfactory standing, students who have been suspended for inadequate scholarship may apply for readmission as probationary students only to the program in which they are enrolled.

Determination of Undergraduate Class Standing

Freshman Standing	0-29 semester credits
Sophomore Standing	30-59 semester credits
Junior Standing	60-89 semester credits
Senior Standing	90 or more



Graduation Information

Graduation Interview

It is the responsibility of each student to arrange for a graduation interview at the Office of the Evening School early in the first semester of the school year in which the student plans to qualify for a degree. A subsequent interview may be required early in the second semester.

Commencement Fee

A fee of \$35.00 is required of graduating students, and is payable on or before registration for the final semester in which the student qualifies for a degree. The fee covers such expenses as diploma, rental of cap and gown, invitations and other printing, and any other expenses approved or directed by the President of the University.

University Honors

The University awards degrees with three levels of distinction upon those graduating students who have exhibited exceptional scholastic records. To be eligible for honor at graduation a student must have achieved a minimum grade-point average of 3.00 for all courses completed at the University (or through its auspices under regulations which govern authorized off-campus course work,) and must have earned a minimum of 60 semester credits at the University (or through its auspices under regulations which govern authorized off-campus work) as upperclass students, or a minimum of 30 semester credits for the Associate Degree. Additionally, each honor student must qualify for the percentile distribution cited below as applied by each college to its total number of graduating students.

Summa Cum Laude 99th through the 98th percentiles

Magna Cum Laude 97th through the 90th percentiles

Cum Laude 89th through the 75th percentiles

Alumni Association

Associate degree and baccalaureate degree students in the senior year of their respective Evening

School programs of study are eligible for membership in the Alumni Association. They may become active members by filing application with the Association, and shall be entitled thereby to vote and hold office in the Association.



Engineering Technology Curricula

Engineering Technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities.

The engineering technology curricula outlined in this catalog are planned sequences of college-level courses leading to an associate or baccalaureate degree designed to prepare students to work in the field of engineering technology. The graduate of an associate degree is generally known as an engineering technician and the graduate of a baccalaureate program is generally known as an engineering technologist.

The Engineering Technology Programs are supervised by a Program Faculty composed of full-time and part-time faculty. The coordinator of each Program Faculty, together with the Department Chairman, sits on the Engineering College Council.

Program Faculties

Civil Engineering Technology

William E. Haskell, Coordinator

Donald G. Leitch

William B. Moeller

Jeremiah F. Murphy

Donald S. Pottle

John J. Sewell

Herman T. Shea

Electronic Engineering Technology

J. Robert A. Lemieux, Coordinator

Ronald D. Brunelle

George P. Cheney

Robert J. Dirkman

Martin A. Patt

James E. Powers

Stephen J. Spurk

David P. Wade

Mechanical Engineering Technology

Frederick B. Bischoff, Coordinator

Robert Z. Hollenbach

William P. Mahoney

John A. McElman

Eugene E. Niemi, Jr.



Course Equivalency Procedures

The Evening School is in full accord with the principle of affording an opportunity for those who have college-level competence in any subject, regardless of how or where they have acquired it, to demonstrate their competence, and to have it recognized by the award of course equivalency credits toward the fulfillment of degree requirements. Students may apply for course equivalency credits up to a maximum of 30 credits; however, the total of equivalency credits and transfer credits may not exceed 90 credits toward the baccalaureate degree.

Course equivalency credits are awarded through successful completion of College Level Equivalency Program (CLEP) examinations. Departmental examinations will not be given if a corresponding CLEP examination is available.

Students interested in taking CLEP subject examinations must complete the "Request for Credit by Examination" form and obtain written approval from the program coordinator before taking the examination.

Students interested in taking departmental examinations must first arrange an interview at which time they must present evidence that they possess sufficient competency to warrant a departmental examination. (Departments reserve the right to refuse the granting of credit by examination for those courses which are presented by a student for his major.) When written permission is given to a student to take a departmental examination, the conditions of the examination will be set forth. A \$25.00 examination fee must be paid before taking the examination.

Students may not request course equivalency credits for courses which they have audited, failed, or withdrawn from; nor for a course in which a substantial portion of the material has been covered by another course and for which the University has granted the student credit; nor for a course which is lower in sequence than a course in which they received University credit.

General Examinations of CLEP may be presented for credit if scores of 500 or better have been obtained, however, these examinations are only applicable to students prior to attending college.

It should be noted that general examination credits may not be applied to a student's degree

requirements when a general examination is cognate with the student's academic major.

CLEP General Examination	Credit Allowed	University Core Requirement
English Composition	6 Semester Hours	English Composition
Mathematics	6 Semester Hours	Mathematics and Science
Natural Sciences	6 Semester Hours	Mathematics and Science
Social Studies	6 Semester Hours	Behavioral and Social Sciences
Humanities	6 Semester Hours	Fine Arts and Humanities

Students must achieve scores which are on or above the "C" grade level for CLEP subject examinations.

Bachelor of Science in Business Administration (Accounting)

(This program will not be available prior to September, 1986)

Students who begin their collegiate studies after August, 1982, and complete the requirements for the Associate of Science degree with concentration in accounting, as outline on the next page, may become candidates for the Bachelor of Science degree by completing the following additional requirements:

History or Political Science Electives	6 credits
Science Electives	6 credits
General Electives	3 credits
92.102 Differential Calculus	3 credits
92.201 Integral Calculus	3 credits
Area II Elective	3 credits
Area I, II or III Electives	6 credits

The following courses cannot be taken before January, 1988

64.307 Government & Business	3 credits
64.312 Managerial Economics	3 credits
60.401 Advanced Financial Accounting I	3 credits
66.498 Business Policy	3 credits
Accounting Electives	6 credits
College of Management Science Elective	<u>3 credits</u>
TOTAL	51 credits

Suggested Sequence Associate of Science Degree

Accounting

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
60.201 Accounting Principles I	3	60.202 Accounting Principles II	3
64.201 Economics I	3	64.202 Economics II	3
42.101 College Writing	3	42.102 College Writing & Lit.	3
	<u>9</u>		<u>9</u>

SECOND YEAR

69.201 Principles of Management	3	*66.331 Business Finance	3
*67.301 Intermediate Accounting I	3	*67.302 Intermediate Accounting II	3
†90.112 College Algebra for Management Science I	3	†90.119 College Algebra for Management Science II	3
	<u>9</u>		<u>9</u>

THIRD YEAR

*90.241 Statistics for Business I	3	*90.242 Statistics for Business II	3
42.224 Business Writing	3	66.321 Marketing Principles	3
*67.411 Cost Accounting I	3	47.101 General Psychology	3
	<u>9</u>		<u>9</u>

FOURTH YEAR

92.242 Basic With Applications	3	*66.332 Money & Banking	3
*66.371 Operations Management I	3	*60.363 Business Law I	3
48.101 Introduction to Sociology	3	*66.253 Organizational Behavior	3
	<u>9</u>		<u>9</u>

This program is available to students beginning their collegiate studies after August, 1982. Students who complete the Associate of Science degree may transfer to the College of Management Science through the University's Admissions Office to the part-time Bachelor of Science in Business Administration degree program, which will be offered in the evening.

*This course requires a qualifying examination, the final examination in the course supervised by the College of Management Science, in order to be accepted for transfer credit towards the Bachelor of Science in Business Administration degree program.

†Students with a strong background in mathematics are advised to substitute 92.101, Precalculus Mathematics, and 92.102, Differential Calculus, for 90.112 and 90.119, if they intend to transfer to the Bachelor of Science in Business Administration. Students taking 90.112 and 90.119 will receive credit for 92.101 in the Baccalaureate Program.

Bachelor of Science in Business Administration (Banking*)

(This program will not be available prior to September, 1986.)

Students who begin their collegiate studies after August, 1982 and complete the requirements for the Associate of Science degree with the concentration in banking, as outlined on the next page, may become candidates for the Bachelor of Science degree by completing the following additional requirements:

*The degree of Bachelor of Science in Business Administration has a concentration in management.

History or Political Science Electives	6 credits
Science Electives	6 credits
General Electives	3 credits
92.102 Differential Calculus	3 credits
92.201 Integral Calculus	3 credits
Area II Elective	3 credits
Area I, II, or III Electives	6 credits
47.101 General Psychology	3 credits
48.101 Introduction to Sociology	3 credits

The following courses cannot be taken before January, 1988:

66.253 Organizational Behavior	3 credits
64.307 Government & Business	3 credits
64.312 Managerial Economics	3 credits
66.498 Business Policy	3 credits
College of Management Science Elective	3 credits
TOTAL	51 credits

Suggested Sequence Associate of Science Degree

Banking

FIRST YEAR

First Semester (Sept.)

Subject No.	Credits
60.201 Accounting Principles I	3
42.101 College Writing	3
*69.101 Principles of Banking	3
	<u>9</u>

Second Semester (Jan.)

Subject No.	Credits
60.202 Accounting Principles II	3
42.102 College Writing & Lit.	3
*69.105 Installment Credit	3
	<u>9</u>

SECOND YEAR

64.201 Economics I	3
†90.112 College Algebra for Management Science I	3
*60.362 Business Law I	3
	<u>9</u>

64.202 Economics II	3
†90.119 College Algebra for Management Science II	3
*66.331 Business Finance	3
	<u>9</u>

THIRD YEAR

*90.241 Statistics for Business I	3
*66.332 Money & Banking	3
*69.102 Bank Management	3
	<u>9</u>

*90.242 Statistics for Business II	3
42.224 Business Writing	3
*69.112 Corporate Banking	3
	<u>9</u>

FOURTH YEAR

92.242 Basic with Applications	3
*60.311 Managerial Accounting	3
*69.106 Real Estate Finance	3
	<u>9</u>

*66.321 Marketing Principles	3
*66.371 Operations Management I	3
*69.111 Negotiable Instruments	3
	<u>9</u>

This program is available to students beginning their collegiate studies after August, 1982. Students who complete the Associate of Science degree may transfer to the College of Management Science through the University's Admissions Office to the part-time Bachelor of Science in Business Administration degree program.

*This course requires a qualifying examination, the final examination in the course supervised by the College of Management Science, in order to be accepted for transfer credit towards the Bachelor of Science in Business Administration degree program.

†Students with a strong background in mathematics are advised to substitute 92.101, Precalculus Mathematics, and 92.102, Differential Calculus, for 90.112 and 90.119, if they intend to transfer to the Bachelor of Science in Business Administration. Students taking 90.112 and 90.119 will receive credit for 92.101 in the Baccalaureate Program.

Bachelor of Science in Business Administration (Management)

(This program will not be available prior to September, 1986.)

Students who begin their collegiate studies after August, 1982 and complete the requirements for the Associate of Science degree with the concentration in management, as outlined on the next page, may become candidates for the Bachelor of Science degree by completing the following additional requirements:

History or Political Science	6 credits
Science Electives	6 credits
General Electives	6 credits
92.102 Differential Calculus	3 credits
92.201 Integral Calculus	3 credits
Area II Elective	3 credits
Area I, II, or III Electives	3 credits

The following courses cannot be taken before January, 1988

64.307 Government & Business	3 credits
64.312 Managerial Economics	3 credits
66.423 Marketing Management	3 credits
66.431 Financial Management	3 credits
66.471 Analytical Methods in Management	3 credits
66.472 Organizational Development	3 credits
66.498 Business Policy	3 credits
TOTAL	51 credits



Suggested Sequence Associate of Science Degree

Management

FIRST YEAR

First Semester (Sept.)

Subject No.	Credits
60.201 Accounting Principles I	3
64.201 Economics I	3
42.101 College Writing	<u>3</u>
	9

Second Semester (Jan.)

Subject No.	Credits
60.202 Accounting Principles II	3
64.202 Economics II	3
42.102 College Writing & Lit.	<u>3</u>
	9

SECOND YEAR

69.201 Principles of Management	3
42.224 Business Writing	3
† 90.112 College Algebra for Management Science I	<u>3</u>
	9

*60.311 Managerial Accounting	3
† 90.119 College Algebra for Management Science II	3
*66.321 Marketing Principles	<u>3</u>
	9

THIRD YEAR

*90.241 Statistics for Business I	3
*66.332 Money & Banking	3
47.101 General Psychology	<u>3</u>
	9

*90.242 Statistics for Business II	3
*66.331 Business Finance	3
48.101 Introduction to Sociology	<u>3</u>
	9

FOURTH YEAR

92.242 Basic with Applications	3
*66.371 Operations Management I	3
*66.253 Organizational Behavior	<u>3</u>
	9

*66.404 Computer Applications to Management	3
*60.362 Business Law I	3
..... Area I, II or III Elective	<u>3</u>
	9

This program is available to students beginning their collegiate studies after August, 1982. Students who complete the Associate of Science degree may transfer to the College of Management Science through the University's Admissions Office to the part-time Bachelor of Science in Business Administration degree program, which will be offered in the evening.

*This course requires a qualifying examination, the final examination in the course supervised by the College of Management Science, in order to be accepted for transfer credit towards the Bachelor of Science in Business Administration degree program.

† Students with a strong background in mathematics are advised to substitute 92.101, Precalculus Mathematics and 92.102, Differential Calculus, for 90.112 and 90.119, if they intend to transfer to the Bachelor of Science in Business Administration. Students taking 90.112 and 90.119 will receive credit for 92.101 in the Baccalaureate Program.

Bachelor of Science

This degree program is available only to students who have commenced their collegiate studies prior to September, 1982.

Accounting

Bachelor of Science Degree Requirements - 126 Credits

Required Courses - Arts and Sciences
45 credits (each subject - 3 credits)

*42.101 College Writing
*42.102 College Writing & Literature
*42.224 Business Writing
*47.101 General Psychology
48.101 Introduction to Sociology
*90.112 College Algebra for
Management Science I
*90.119 College Algebra for
Management Science II
*90.241 Statistics for Business I
*90.242 Statistics for Business II
*92.209 Introduction to Basic
*64.201 Economics I
*64.202 Economics II
64.307 Government & Business
66.332 Money & Banking
68.312 Managerial Economics

Required Courses - Business
39 credits (each subject - 3 credits)

*60.201 Accounting Principles I
60.362 Business Law I
*60.202 Accounting Principles II
*66.331 Business Finance
*66.371 Operations Management I
*67.301 Intermediate Accounting I
*67.302 Intermediate Accounting II
67.401 Advanced Financial
Accounting I
*67.402 Advanced Financial
Accounting II
*67.411 Cost Accounting I
67.421 Auditing
*69.201 Principles of Management
69.498 Business Policy

Required Electives - 42 Credits

Accounting Electives	- 6 credits
Behavioral and Social Science Electives (Area I)	- 6 credits
Fine Arts and Humanities Electives (Area II)	- 6 credits
Science Electives	- 6 credits
Free Electives	-15 credits
Computer Elective (92.263 or 92.365)	- 3 credits

Associate of Science Degree Requirements - 72 Credits

Required courses - Arts and Sciences	-33 credits (as asterisked)
Required courses - Business	-24 credits (as asterisked)
Area I and/or Area II Electives	- 6 credits
Free Electives	- 6 credits
Computer Elective (92.263 or 92.365)	- 3 credits

Suggested Sequence Associate of Science Degree

This degree program is available only to students who have commenced their collegiate studies prior to September, 1982. This program is being phased out. Students who have commenced their collegiate studies prior to Sept. 1982 may transfer into this program.

Accounting

SECOND YEAR			
First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
69.201 Principles of Management	3	66.331 Business Finance	3
67.301 Intermediate Accounting I	3	67.302 Intermediate Accounting II	3
90.112 College Algebra for Management Science I	3	90.119 College Algebra for Management Science II	3
	<u>9</u>		<u>9</u>
THIRD YEAR			
90.241 Statistics for Business I	3	90.242 Statistics for Business II	3
42.224 Business Writing	3	 Area I or II Elective	3
67.411 Cost Accounting I	3	 Elective	3
	<u>9</u>		<u>9</u>
FOURTH YEAR			
92.209 Introduction to Basic	3	 Computer Elective	3
66.371 Operations Management I	3	 Elective	3
..... Area I or II Elective	3	47.101 General Psychology	3
	<u>9</u>		<u>9</u>

Recommended electives for Accounting concentration:
67.412, 67.422, 67.431, 60.363

It is recommended that other free electives be selected from management, economics, banking, and computer science areas. Students whose collegiate studies started September, 1982 or thereafter should refer to page 26.

Bachelor of Science

This degree program is available only to students who have commenced their collegiate studies prior to September, 1982.

Banking

Bachelor of Science Degree Requirements - 126 Credits

Required Courses - Arts and Sciences
45 credits (each subject - 3 credits)

- *42.101 College Writing
- *42.102 College Writing & Literature
- *42.224 Business Writing
- 47.101 General Psychology
- 48.101 Introduction to Sociology
- *90.112 College Algebra for
Management Science I
- *90.119 College Algebra for
Management Science II
- *92.209 Introduction to Basic
- *64.201 Economics I
- *64.202 Economics II
- 64.307 Government & Business
- *66.332 Money & Banking
- 68.312 Managerial Economics
- *90.241 Statistics for Business I
- *90.242 Statistics for Business II

Required Courses - Business
39 credits (each subject - 3 credits)

- *60.201 Accounting Principles I
- *60.202 Accounting Principles II
- *60.362 Business Law I
- *66.331 Business Finance
- 66.451 Personnel Management
- *69.101 Principles of Management
- *60.102 Bank Management
- *69.103 Credit Administration
- *69.105 Installment Credit
- 69.106 Real Estate Finance
- 69.107 Bank Investments
- 69.111 Negotiable Instruments
- 69.498 Business Policy

Required Electives - 42 Credits

- | | |
|---|-------------|
| Behavioral and Social Science
Electives (Area I) | - 6 credits |
| Fine Arts and Humanities
Electives (Area II) | - 6 credits |
| Science Electives | - 6 credits |
| Management Electives | - 6 credits |
| Free Electives | -15 credits |
| Computer Elective (92.263 or 92.365) | - 3 credits |

Associate of Science Degree Requirements - 72 Credits

- | | |
|--------------------------------------|-----------------------------|
| Required Courses - Arts and Sciences | -33 credits (as asterisked) |
| Required Courses - Business | -24 credits (as asterisked) |
| Area I and/or Area II Elective | - 6 credits |
| Free Electives | - 6 credits |
| Computer Elective (92.263 or 92.365) | - 3 credits |

Suggested Sequence Associate of Science Degree

This degree program is available only to students who have commenced their collegiate studies prior to September, 1982. This program is being phased out. Students who have commenced their collegiate studies prior to Sept. 1982 may transfer into this program.

Banking

SECOND YEAR			
First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
64.201 Economics I	3	64.202 Economics II	3
90.112 College Algebra for Management Science I	3	90.119 College Algebra for Management Science II	3
60.362 Business Law I	3	66.331 Business Finance	3
	<u>9</u>		<u>9</u>
THIRD YEAR			
90.241 Statistics for Business I	3	90.242 Statistics for Business II	3
66.332 Money & Banking	3	42.224 Business Writing	3
69.102 Bank Management	3	69.105 Installment Credit	3
	<u>9</u>		<u>9</u>
FOURTH YEAR			
..... Elective	3	 Elective	3
..... Area I or II Elective	3	 Area I or II Elective	3
92.209 Introduction to Basic	3	 Computer Elective	3
	<u>9</u>		<u>9</u>

Recommended electives for Banking concentration:
 69.104, 69.108, 69.109, 60.363

It is recommended that other free electives be selected from the accounting, economics, managment, and computer science areas. Students whose collegiate studies started September, 1982 or thereafter should refer to page 28.

Bachelor of Science

This degree program is available only to students who have commenced their collegiate studies prior to September, 1982.

Management

Bachelor of Science Degree Requirements - 126 Credits

Required Courses - Arts and Sciences
45 credits (each subject - 3 credits)

*42.101 College Writing
*42.102 College Writing & Literature
*42.224 Business Writing
*47.101 General Psychology
48.101 Introduction to Sociology
*90.112 College Algebra for
Management Science I
*90.119 College Algebra for
Management Science II
*92.209 Introduction to Basic
*64.201 Economics I
*64.202 Economics II
64.307 Government & Business
66.332 Money and Banking
68.312 Managerial Economics
*90.241 Statistics for Business I
*90.242 Statistics for Business II

Required Courses - Business
30 credits (each subject - 3 credits)

*60.201 Accounting Principles I
*60.202 Accounting Principles II
*60.311 Managerial Accounting
60.362 Business Law I
66.321 Marketing Principles
*66.331 Business Finance
*66.371 Operations Management I
66.451 Personnel Management
*69.201 Principles of Management
69.498 Business Policy

Required Electives - 51 Credits

Management Electives	-15 credits
Behavioral and Social Science Electives (Area I)	- 6 credits
Fine Arts and Humanities Electives (Area II)	- 6 credits
Science Electives	- 6 credits
Free Electives	-15 credits
Computer Elective (92.263 or 92.365)	- 3 credits

Associate of Science Degree Requirements - 72 Credits

Required courses - Arts and Sciences	-33 credits (as asterisked)
Required courses - Business	-18 credits (as asterisked)
Management Electives	- 6 credits
Area I and/or Area II Electives	- 6 credits
Free Electives	- 6 credits
Computer Elective (92.263 or 92.365)	- 3 credits

Suggested Sequence Associate of Science Degree

This degree program is available only to students who have commenced their collegiate studies prior to September, 1982. This program is being phased out. Students who have commenced their collegiate studies prior to Sept. 1982 may transfer into this program.

Management

SECOND YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
69.201 Principles of Management	3	60.311 Managerial Accounting	3
42.224 Business Writing	3	90.119 College Algebra for	
90.112 College Algebra for		Management Science II	3
Management Science I	<u>3</u>	 Area I Elective	<u>3</u>
	9		9

THIRD YEAR

90.241 Statistics for Business I	3	90.242 Statistics for Business II	3
..... Management Elective	3	66.331 Business Finance	3
..... Elective	<u>3</u>	 Management Elective	<u>3</u>
	9		9

FOURTH YEAR

92.209 Introduction to Basic	3	 Computer Elective	3
66.371 Operations Management I	3	 Elective	3
..... Area II Elective	<u>3</u>	47.101 General Psychology	<u>3</u>
	9		9

Recommended electives for Management concentration:

60.363, 66.372, 69.410, 66.421, 66.426, 66.452

It is recommended that other free electives be selected from the accounting, banking, economics, and computer science areas. Students whose collegiate studies started September, 1982 or thereafter should refer to page 30.

Bachelor of Science

Information Systems

Bachelor of Science Degree Requirements - 126 Credits

Required Courses - Arts and Sciences

33 credits (each subject - 3 credits)

- *42.101 College Writing
- *42.102 College Writing & Literature
- *42.224 Business Writing
- 47.101 General Psychology
- 48.101 Introduction to Sociology
- *90.112 College Algebra for
Management Science I
- *90.119 College Algebra for
Management Science II
- *64.201 Economics I
- *64.202 Economics II
- *90.241 Statistics for Business I
- *90.242 Statistics for Business II

Required Courses - Business

21 credits (each subject - 3 credits)

- *60.201 Accounting Principles I
- *60.202 Accounting Principles II
- *60.311 Managerial Accounting
- 66.321 Marketing Principles
- *66.331 Business Finance
- *66.371 Operations Management I
- *69.201 Principles of Management

Required Courses - Computer Sciences

30 credits (each subject - 3 credits)

- *92.209 Introduction to Basic OR
- *92.219 Basic Programming
- *92.263 Fortran Programming
- *92.365 Cobol Programming I
- *92.368 Cobol Programming II
- *92.367 Assembly Language
Programming I
- *92.462 Systems Programming
- 92.477 Management Information
Systems I
- 92.478 Management Information
Systems II
- 92.265 Introduction to Pascal
- 92.474 Data Base Concepts

- 6 credits

- 6 credits

- 6 credits

-24 credits

Required Electives - 42 Credits

Behavioral and Social Sciences

Electives (Area I)

Fine Arts and Humanities

Electives (Area II)

Science Electives

Free Electives (May **not** be

selected from accounting, economics,
banking or management)

Associate of Science Degree Requirements - 72 Credits

Required Courses - Arts and Sciences

-27 credits (as asterisked)

Required Courses - Business

-18 credits (as asterisked)

Required Courses - Computer Science

-18 credits (as asterisked)

Area I and/or Area II Electives

- 3 credits

Free Electives

- 6 credits

Suggested Sequence Associate of Science Degree

Information Systems

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
*92.209 Introduction to Basic	3	92.263 Fortran Programming	3
or		90.119 College Algebra for	
92.219 Basic Programming	3	Management Science II	3
42.101 College Writing	3	42.102 College Writing &	
90.112 College Algebra for		Literature	3
Managment Science I	3		9
	<u>9</u>		

SECOND YEAR

60.201 Accounting Principles I	3	60.202 Accounting Principles II	3
42.224 Business Writing	3	69.201 Principles of Management	3
92.365 Cobol Programming I	3	92.368 Cobol Programming II	3
	<u>9</u>		<u>9</u>

THIRD YEAR

92.367 Assembly Language Prog. I	3	92.462 Systems Programming	3
60.311 Managerial Accounting	3	66.331 Business Finance	3
64.201 Economics I	3	64.202 Economics II	3
	<u>9</u>		<u>9</u>

FOURTH YEAR

90.241 Statistics for Business I	3	90.242 Statistics for Business II	3
..... Area I Elective	3	66.371 Operations Management I	3
..... Elective	3	 Elective	3
	<u>9</u>		<u>9</u>

*92.209 Introduction to Basic is for students with no prior programming experience.

92.219 Basic Programming is for students with prior programming experience.

Note: 92.321 Discrete Structures is recommended for students planning graduate study

Bachelor of Science

Public Service

(Administration of Criminal Justice)

Bachelor of Science Degree Requirements - 126 credits

General University Requirements

33 credits (each subject - 3 credits)

42.101 College Writing

- 3 credits

42.102 College Writing & Literature

- 3 credits

Area I - Behavioral and Social Sciences

- 9 credits

(must include 47.101 General Psychology and 48.101 Introduction to Sociology)

Area II - Fine Arts and Humanities

- 6 credits

Area III - Mathematics and the Sciences

-12 credits

(must include 90.111 Fundamentals of Algebra and 90.112 College Algebra for Management Science I)

Criminal Justice Requirements

36 credits (each subject - 3 credits)

Selected from the concentration track.

Additional Requirements

51 credits (each subject - 3 credits)

Free Electives

-39 credits

Selected with permission of coordinator.

Professional Skills

-12 credits

Students majoring in this program can fulfill the professional skills requirements in either one of the following areas:

- I Foreign Language - Intermediate level proficiency of a foreign language is required.
- II Computer Sciences - The following sequence of 12 semester hours are necessary:
 - 92.209 - Introduction to Basic
 - 92.263 - Fortran Programming
 - 92.365 - COBOL Programming I
 - 92.383 - Introduction to Statistics

Associate of Science Degree Requirements - 60 Credits

Public Service: Administration of Criminal Justice (Police Science)

General University Requirements	-33 credits
Criminal Justice Requirements	-18 credits (asterisked)
Free Electives with permission of coordinator	- 9 credits

Associate of Science Degree Requirements - 60 Credits

Public Service: Administration of Criminal Justice (Corrections Administration)

General University Requirements	-33 credits
Criminal Justice Requirements	-18 credits (asterisked)
Free Electives with permission of coordinator	- 9 credits



Bachelor of Science

Public Service (Administration of Criminal Justice)

TRACKS: There are three main areas of tracks a student may elect: Enforcement, Corrections, or Law and the Courts. Courses suggested for one track are not exclusive, however, and some crossover is desirable.

ENFORCEMENT

- *† 44.101 The Criminal Justice System
- *† 44.131 Principles of Law and the Criminal Justice System
- * 44.141 Police Functions
- *† 44.221 Criminology I
- 44.234 Criminal Law
- * 44.243 Criminalistics I
- 44.244 Criminalistics II
- * 44.261 Juvenile Delinquency
- 44.341 Comparative Police Systems
- 44.371 Criminal Justice Management and Planning
- 44.373 Issues in Police Administration
- † 44.390 Research Methods in Criminal Justice
- † 44.490 Research Seminar in Criminal Justice
- † 44.496 Practicum (In-service students will substitute 44.371)

LAW AND THE COURTS

- † 44.101 The Criminal Justice System
- † 44.131 Principles of Law and the Criminal Justice System
- † 44.221 Criminology I
- 44.234 Criminal Law
- 44.261 Juvenile Delinquency
- 44.321 Criminology II
- 44.331 Penal Law
- 44.335 Juvenile Court Philosophy and Practice
- 44.354 Probation and Parole
- 44.360 Minorities and the Criminal Justice System
- 44.371 Criminal Justice Management and Planning
- 44.380 Selected Issues
- † 44.390 Research Methods in Criminal Justice
- † 44.490 Research Seminar in Criminal Justice
- † 44.496 Practicum (In-service students will substitute 44.371)

*Associate Degree Required Courses

†Bachelor Degree Required Courses

CORRECTIONS

- *† 44.101 The Criminal Justice System
- *† 44.131 Principles of Law and the Criminal Justice System
- * 44.151 Introduction to Corrections
- *† 44.221 Criminology I
- * 44.234 Criminal Law
- * 44.261 Juvenile Delinquency
- 44.331 Penal Law
- 44.351 Alternatives to Corrections
- 44.354 Probation and Parole
- 44.371 Criminal Justice Management and Planning
- 44.372 Issues in Correctional Administration
- † 44.390 Research Methods in Criminal Justice
- † 44.490 Research Seminar in Criminal Justice
- † 44.496 Practicum (In-service students will substitute 44.371)

*Associate Degree Required Courses

†Bachelor Degree Required Courses

Suggested Subjects for First Two Years

FIRST YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
44.101	The Criminal Justice System	3	44.221	Criminology I	3
42.101	College Writing	3	42.102	College Writing & Literature	3
48.101	Introduction to Sociology	<u>3</u>	47.101	General Psychology	<u>3</u>
		9			9

SECOND YEAR

44.131	Princ. of Law & Legal System	3	44.261	Juvenile Delinquency	3
90.111	Fundamentals of Algebra	3	90.112	College Algebra for	
.....	Area I or II Elective	<u>3</u>		Management Science I	3
		9	.....	Area I or II Elective	<u>3</u>
					9

Bachelor of Science

Applied Chemistry

Years 1-4 - Leading to the Degree of Associate of Science

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
84.121 Chemistry I	3	84.122 Chemistry II	3
90.113 College Algebra	3	92.115 College Trigonometry	3
42.101 College Writing	3	42.102 College Writing & Literature	3
	<u>9</u>		<u>9</u>

SECOND YEAR

86.121 Analytical Chemistry	3	86.122 Analytical Chemistry	3
90.131 Calculus I	3	90.132 Calculus II	3
99.141 Physics I	4	99.142 Physics II	4
	<u>10</u>		<u>10</u>

THIRD YEAR

84.223 Princ. of Organic Chem. I	3	84.224 Princ. of Organic Chem. II	3
84.225 Princ. of Organic Chem Lab I	1	84.226 Princ. of Organic Chem Lab II	1
17.127 Electrical Fundamentals	3	99.143 Physics III	4
	<u>7</u>		<u>8</u>

FOURTH YEAR

84.344 Physical Chemistry I	3	84.345 Physical Chemistry II	3
84.346 Physical Chemistry Lab I	1	84.347 Physical Chem. Lab II	1
..... Elective	3	 Elective	3
	<u>7</u>		<u>7</u>

All electives shall be chosen after conference with the Program Coordinator and **MUST** be approved by him.

Applied Chemistry

Years 5-8 - Leading to the Degree of Bachelor of Science

FIFTH YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
84.334 Advanced Inorganic Chemistry	3	86.352 Chemical Applications	3
92.383 Introduction to Statistics	3	92.263 Fortran Programming	3
42.225 Technical & Scientific Writing	3	 Area II Elective	3
	<u>9</u>		<u>9</u>

SIXTH YEAR

86.361 Advanced Organic Chemistry	3	86.362 Advanced Organic Chemistry	3
27.201 Plastics Material Science	3	69.201 Principles of Management	3
..... Area I Elective	3	22.295 Materials Science	3
	<u>9</u>		<u>9</u>

SEVENTH YEAR

86.471 Industrial Chemistry	3	84.314 Analytical Chemistry II	3
64.201 Economics I	3	84.316 Analytical Chemistry II Lab.	1
..... Area I or II Elective	3	64.202 Economics II	3
	<u>9</u>		<u>7</u>

EIGHTH YEAR

86.481 Chemistry of High Polymers	3	86.482 Chemistry of High Polymers	3
..... Elective	3	 Elective	3
..... Elective	3	 Elective	3
	<u>9</u>		<u>9</u>

All electives shall be chosen after conference with the Program Coordinator and MUST be approved by him.

Bachelor of Science

Applied Mathematics - Computer Science Option

Years 1-4 - Leading to the Degree of Associate of Science

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
*92.209	Introduction to Basic OR		
92.219	Basic Programming 3	92.263	Fortran Programming 3
90.113	College Algebra 3	92.115	College Trigonometry 3
42.101	College Writing <u>3</u>	42.102	College Writing & Literature <u>3</u>
	9		9

SECOND YEAR

64.201	Economics I 3	64.202	Economics II 3
92.367	Assembly Lang. Prog. I 3	90.132	Calculus II 3
90.131	Calculus I <u>3</u>	92.265	Introduction to Pascal <u>3</u>
	9		9

THIRD YEAR

92.463	Systems Design & Dev. I 3	92.464	Systems Design & Dev. II 3
90.231	Calculus III 3	90.232	Calculus IV 3
92.383	Introduction to Statistics <u>3</u>	99.141	Physics I <u>4</u>
	9		10

FOURTH YEAR

92.461	Systems Simulation & Modeling 3	92.462	Systems Programming 3
99.142	Physics II 4	.....	Area I or II Elective 3
92.321	Discrete Structures <u>3</u>	42.225	Technical & Scientific Writing <u>3</u>
	10		9

*92.209 is for students with NO prior programming experience.
 92.219 is for students with prior programming experience.

Applied Mathematics - Computer Science Option

Years 5-8 - Leading to the Degree of Bachelor of Science

FIFTH YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
92.234	Differential Equations	3	.....	Computer Science Elective	3
.....	Area I Elective	3	.....	Area II Elective	3
*	Technical Elective	3	*	Technical Elective	3
		<u>9</u>			<u>9</u>

SIXTH YEAR

92.362	Numerical Analysis I	3	92.454	Numerical Analysis II	3
92.301	Applied Mathematics	3	92.302	Applied Mathematics II	3
**	Technical Elective	3	**	Technical Elective	3
		<u>9</u>			<u>9</u>

SEVENTH YEAR

.....	Computer Science Elective	3	.....	Computer Science Elective	3
.....	Mathematics Elective	3	.....	Mathematics Elective	3
.....	Technical Elective	3	.....	Technical Elective	3
		<u>9</u>			<u>9</u>

EIGHTH YEAR

.....	Computer Science Elective	3	.....	Computer Science Elective	3
92.411	Complex Variables I	3	.....	Mathematics Elective	3
.....	Technical Elective	3	.....	Technical Elective	3
		<u>9</u>			<u>9</u>

*Those holding an Associate of Science (Mathematics) must take 92.367 and 92.462. Those holding an Associate of Science (Computer Science) must take 90.221 and 90.222.

**Those holding an Associate of Science (Mathematics) must take 92.463 and 92.464. Those holding an Associate of Science (Computer Science) must take 84.121 and 84.122.

All Technical Electives shall be chosen after conference with the Program Coordinator and MUST be approved by him.

Bachelor of Science

Applied Mathematics

Years 1-4 - Leading to the Degree of Associate of Science

FIRST YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
64.201	Economics I	3	64.202	Economics II	3
90.113	College Algebra	3	92.115	College Trigonometry	3
42.101	College Writing	3	42.102	College Writing & Literature	3
		<u>9</u>			<u>9</u>

SECOND YEAR

92.209	Introduction to Basic OR		92.265	Introduction to Pascal	3
92.219	Basic Programming	3	90.132	Calculus II	3
90.131	Calculus I	3	99.142	Physics II	4
99.141	Physics I	4			<u>10</u>
		<u>10</u>			

THIRD YEAR

90.231	Calculus III	3	90.232	Calculus IV	3
92.383	Introduction to Statistics	3	42.225	Technical & Scientific Writing	3
.....	Area I Elective	3	.....	Elective	3
		<u>9</u>			<u>9</u>

FOURTH YEAR

84.121	Chemistry I	3	84.122	Chemistry II	3
92.461	Systems Simulation & Modeling	3	90.222	Applied Linear Algebra II	3
90.221	Applied Linear Algebra I	3	.....	Area I or II Elective	3
		<u>9</u>			<u>9</u>

*92.209 is for students with NO prior programming experience.

92.219 is for students with prior programming experience.

Applied Mathematics

Years 5-8 - Leading to the Degree of Bachelor of Science

FIFTH YEAR

First Semester (Sept.)

Subject No.	Credits
92.234 Differential Equations	3
92.321 Discrete Structures	3
*..... Technical Elective	<u>3</u>
	9

Second Semester (Jan.)

Subject No.	Credits
90.315 Partial Differential Equations	3
..... Area II Elective	3
*..... Technical Elective	<u>3</u>
	9

SIXTH YEAR

92.362 Numerical Analysis I	3
92.301 Intro to Applied Math. I	3
**† ... Technical Elective	<u>3</u>
	9

92.454 Numerical Analysis II	3
92.302 Intro to Applied Math. II	3
**† ... Technical Elective	<u>3</u>
	9

SEVENTH YEAR

† Computer Science Elective	3
..... Mathematics Elective	3
..... Technical Elective	<u>3</u>
	9

† Computer Science Elective	3
..... Mathematics Elective	3
..... Technical Elective	<u>3</u>
	9

EIGHTH YEAR

† Computer Science Elective	3
92.411 Complex Variables I	3
..... Technical Elective	<u>3</u>
	9

† Computer Science Elective	3
..... Mathematics Elective	3
..... Technical Elective	<u>3</u>
	9

*Those holding an Associate of Science (Mathematics) must take 92.367 and 92.462. Those holding an Associate of Science (Computer Science) must take 90.221 and 90.222.

**Those holding an Associate of Science (Mathematics) must take 92.463 and 92.464. Those holding an Associate of Science (Computer Science) must take 84.121 and 84.122.

†The above courses may be replaced by a sequence of related courses approved by the Program Coordinator.

All other electives shall be chosen after conference with the Program Coordinator and MUST be approved by him.

Bachelor of Science

Nursing

Years 1-4 - Leading to evaluation for continuation in Nursing Program.

FIRST YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
42.101	College Writing	3	42.102	College Writing & Literature	3
84.111	General Chemistry I	3	84.112	General Chemistry II	3
84.113	General Chemistry Lab I	<u>1</u>	84.114	General Chemistry Lab II	<u>1</u>
		7			7

SECOND YEAR

35.201	Human Anat. & Phys. I	3	35.202	Human Anat. & Phys. II	3
35.203	Human Anat. & Phys. Lab I	1	35.204	Human Anat. & Phys. Lab II	1
47.101	General Psychology	<u>3</u>	48.101	Intro. to Sociology	<u>3</u>
		7			7

THIRD YEAR

92.383	Introduction to Statistics	3	47.163	The Human Life Span	3
47.232	Psychology of Personality	3	47.328	Dynamics of Interpersonal Relations	3
45.202	Introduction to Logic	<u>3</u>	.....	Area II Elective	<u>3</u>
		9			9

FOURTH YEAR

30.201	Community Health	3	*33.201	Concepts of Professional Nursing Practice	6
35.211	Basic Clinical Microbiology & Pathology	3	33.202	Pathophysiology	3
35.213	Basic Clinical Microbiology & Pathology Lab	<u>1</u>	.....	Free Elective	<u>3</u>
		7			12

All students planning to enter this program **MUST** make an appointment with the Program Coordinator before taking classes.

*Eligible students **MUST** obtain the **signed permission** of the Program Coordinator before registering for any course with a prefix of 33.

Nursing

Years 5-8 - Leading to the Degree of Bachelor of Science

FIFTH YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
33.401	Nursing Care of Clients in Crisis	6	33.401	Nursing Care of Clients in Crisis	6
.....	Elective	<u>3</u>	.....	Elective	<u>3</u>
		9			9

SIXTH YEAR

33.402	Issues and Trends in Nursing	2	33.404	Comprehensive Nursing Practice	6
33.403	Leadership-Nursing Practice	5	.....	Elective (300-400 Level)	<u>3</u>
.....	Elective (300-400 level)	<u>3</u>			9
		10			

NOTE: if there is sufficient student interest, the sixth year will also be offered as a ten week summer day session.

Students must pass course equivalency examinations in Day School Junior Year subjects and their clinical components in order to be admitted to the fifth year of the Evening Program. Students should consult the Program Coordinator.



Bachelor of Science in Engineering Technology

Civil Engineering Technology

Years 1-4 - Leading to the Degree of Associate of Science in Engineering Technology

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
90.113 College Algebra	3	92.115 College Trigonometry	3
23.111 Engineering Drawing I	2	23.112 Engineering Drawing II	2
42.101 College Writing	<u>3</u>	92.263 Fortran Programming	<u>3</u>
	8		8

SECOND YEAR

15.123 Surveying I	4	15.124 Surveying II	4
90.131 Calculus I	3	90.132 Calculus II	3
99.141 Physics I	<u>4</u>	99.142 Physics II	<u>4</u>
	11		11

THIRD YEAR

15.237 Statics	3	15.239 Strength of Materials	3
15.257 Highway Elements	3	15.243 Construction Materials	3
42.102 College Writing & Literature	<u>3</u>	42.225 Tech. & Scientific Writing	<u>3</u>
	9		9

FOURTH YEAR

15.251 Structural Analysis I	3	15.242 Steel Design I	3
15.253 Reinforced Concrete I	3	15.246 Intro. to Hydraulics	3
15.255 Environmental Engin'g. I	<u>3</u>	15.254 Soil Mechanics I	<u>3</u>
	9		9

Civil Engineering Technology

Years 5-8 - Leading to the Degree of Bachelor of Science in Engineering Technology.

FIFTH YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
15.391 Reinforced Concrete II	3	15.356 Environmental Engin'g II	3
84.111 General Chemistry I	3	15.383 Steel Design II	3
84.113 General Chemistry I Lab	<u>1</u>	 Area I Elective	<u>3</u>
	7		9

SIXTH YEAR

15.392 Soil Mechanics II	3	15.394 Soil Mechanics Lab	1
15.352 Structural Analysis II	3	 Area II Elective	3
90.231 Calculus III	<u>3</u>	92.383 Intro. to Statistics	<u>3</u>
	9		7

SEVENTH YEAR

64.201 Economics I	3	64.202 Economics II	3
17.127 Electrical Fundamentals	3	99.143 Physics III	4
15.238 Dynamics	<u>3</u>	 Technical Elective	<u>3</u>
	9		10

EIGHTH YEAR

15.463 Construction Engineering	3	15.486 Transportation Elements	3
20.414 Industrial Economics Mgt.	3	 Area I or II Elective	3
..... Technical Elective	<u>3</u>	 Technical Elective	<u>3</u>
	9		9

15.352, 15.356, 15.383, 15.392 are offered in odd years only.

15.391, 15.394, 15.463, 15.486 are offered in even years only.

Technical electives MUST be approved by the Program Coordinator.

Bachelor of Science in Engineering Technology

Electronic Engineering Technology

Years 1-4 - Leading to the Degree of Associate of Science in Engineering Technology

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
90.113 College Algebra	3	92.115 College Trigonometry	3
42.101 College Writing	3	92.263 Fortran Programming	3
..... Area I or II Elective	3	42.102 College Writing & Literature	3
	<u>9</u>		<u>9</u>

SECOND YEAR

17.223 Electric Circuits I	3	17.224 Electric Circuits II	3
90.131 Calculus I	3	90.132 Calculus II	3
99.141 Physics I	4	99.142 Physics II	4
	<u>10</u>		<u>10</u>

THIRD YEAR

17.225 Electric Circuits III	3	17.240 Electromechanics	3
17.237 Electronics Lab I	1	17.351 Electronics I	3
90.231 Calculus III	3	90.232 Calculus IV	3
	<u>7</u>		<u>9</u>

FOURTH YEAR

92.367 Assembly Lang. Prog. I	3	17.350 Control Systems I	3
17.352 Electronics II	3	17.353 Digital Electronics	3
17.359 Electronics Lab II	1	17.360 Electronics Lab III	1
	<u>7</u>		<u>7</u>

Students enrolling in this program should purchase an electronic calculator capable of handling logarithmic and trigonometric functions. The use of the calculator will be an integral part of courses 17.223 and 17.224, where proficiency will be developed. Competency in the use of the calculator will be assumed in all subsequent EE courses.

Students terminating with the Associate in Engineering Technology Degree may replace 90.231 and 90.232 with APPROVED technical electives.

All electives shall be chosen after conference with the Program Coordinator and MUST be approved by him. If electives are not properly approved, it is possible they will not be credited toward the degree requirement.

Electronic Engineering Technology

Years 5-8 - Leading to the Degree of Bachelor of Science in Engineering Technology.

FIFTH YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
17.361 Project Laboratory A	2	84.121 Chemistry I	3
17.371 Logic Design I	3	17.372 Logic Design II	3
92.234 Differential Equations	<u>3</u>	17.376 Electromagnetic Theory I	<u>3</u>
	8		9

SIXTH YEAR

17.365 Applied Linear Devices	3	17.366 Applied Digital Devices	3
17.381 Engineering Prob. Sol. I	3	17.382 Engineering Prob. Sol. II	3
42.225 Tech. & Scientific Writing	<u>3</u>	 Area II Elective	<u>3</u>
	9		9

SEVENTH YEAR

99.143 Physics III	4	23.455 Thermo & Heat Transfer	3
17.4. . E.E.T. Elective	3	17.4. . E.E.T. Elective	3
..... Technical Elective	1 or <u>3</u>	 Area I Elective	<u>3</u>
	8 or 10		9

EIGHTH YEAR

64.201 Economics I	3	64.202 Economics II	3
17.391 Project Laboratory B	2	17.392 Project Laboratory C	2
17.4. . E.E.T. Elective	<u>3</u>	17.4. . E.E.T. Elective	<u>3</u>
	8		8

All other electives shall be chosen after conference with the Program Coordinator and **MUST** be approved by him.

If electives are not properly approved, it is possible they will not be credited toward the degree requirement.

Bachelor of Science in Engineering Technology

Mechanical Engineering Technology

Years 1-4 - Leading to the Degree of Associate of Science in Engineering Technology.

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
90.113 College Algebra	3	92.115 College Trigonometry	3
23.111 Engineering Drawing I	2	23.112 Engineering Drawing II	2
42.101 College Writing	<u>3</u>	42.102 College Writing & Lit.	<u>3</u>
	8		8

SECOND YEAR

90.131 Calculus I	3	90.132 Calculus II	3
99.141 Physics I	4	99.142 Physics II	4
23.113 Machine Drawing	<u>2</u>	42.225 Tech. & Scientific Writing	<u>3</u>
	9		10

THIRD YEAR

99.143 Physics III	4	23.201 Machine Tool Lab	1
23.221 Statics	3	23.222 Dynamics	3
22.295 Materials Science	<u>3</u>	23.223 Mechanics of Materials I	<u>3</u>
	10		7

FOURTH YEAR

23.241 Elements of Thermo. I	3	23.243 Elements of Thermo. II	3
23.242 Applied Fluid Mechanics	3	23.202 Thermo/Fluid Lab	2
22.320 Machine Design I	<u>3</u>	 Area I or II Elective	<u>3</u>
	9		8

Mechanical Engineering Technology

Years 5-8 - Leading to the Degree of Bachelor of Science in Engineering Technology.

FIFTH YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
84.121 Chemistry I	3	23.354 Problems in M.E. Technology	3
17.127 Electrical Fundamentals	3	17.128 Basic Electronics	3
90.231 Calculus III	<u>3</u>	90.232 Calculus IV	<u>3</u>
	9		9

SIXTH YEAR

92.263 Fortran Programming	3	47.101 General Psychology	3
23.472 Applied Dynamics	3	22.302 Mechanics/Materials Lab	2
..... Area II Elective	<u>3</u>	22.473 Mechanics of Materials II	<u>3</u>
	9		8

SEVENTH YEAR

64.201 Economics I	3	64.202 Economics II	3
23.475 Heat Transfer	3	 Technical Elective	3
..... Free Elective	<u>3</u>	 Free Elective	<u>3</u>
	9		9

EIGHTH YEAR

20.414 Industrial Economic Mgt.	3	23.405 Senior Project	3
20.305 Manufacturing Processes	3	 Area I or II Elective	3
..... Technical Elective	<u>3</u>	 Technical Elective	<u>3</u>
	9		9

All technical electives shall be chosen after conference with the Program Coordinator and MUST be approved by him.

Bachelor of Science in Technology

Industrial Technology - Manufacturing Option

FIRST YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
42.101	College Writing	3	42.102	College Writing & Lit.	3
90.113	College Algebra	3	92.115	College Trigonometry	3
60.201	Accounting Principles I	<u>3</u>	47.101	General Psychology	<u>3</u>
		9			9

SECOND YEAR

20.105	Intro. to Engin'g. Design	3	23.201	Machine Tool Lab	1
20.107	Engineering Design Lab	1	90.132	Calculus II	3
90.131	Calculus I	<u>3</u>	99.141	Physics I	<u>4</u>
		7			8

THIRD YEAR

23.221	Statics	3	64.201	Economics I	3
84.111	General Chemistry I	3	42.225	Tech. & Scientific Writing	3
84.113	General Chemistry I Lab	<u>1</u>	92.383	Intro. to Statistics	<u>3</u>
		7			9

FOURTH YEAR

20.201	Introduction to Metals	3	20.208	Advanced Materials	3
20.307	Fluid Power Controls	3	66.253	Organizational Behavior	3
20.310	Industrial Safety	<u>3</u>	20.211	Industrial Tech. Lab	<u>1</u>
		9			7

FIFTH YEAR

27.201	Plastics Materials Science	3	66.321	Marketing Principles	3
20.314	Motion & Time Study	3	20.416	Statistical Quality Control	3
92.209	Introduction to Basic	<u>3</u>	92.263	Fortran Programming	<u>3</u>
		9			9

SIXTH YEAR

20.305	Manufacturing Processes	3	20.407	Instr. & Process Control	3
17.127	Electrical Fundamentals	3	20.409	Instrumentation Lab	1
17.129	Electrical Fundamentals Lab	<u>1</u>	.....	Area II Elective	<u>3</u>
		7			7

Industrial Technology - Manufacturing Option

SEVENTH YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
66.371	Operations Management I	3	20.402	Manufacturing Oper.	3
.....	Technical Elective	3	17.128	Basic Electronics	3
.....	Area I or II Elective	<u>3</u>	.....	Area II Elective	<u>3</u>
		9			9

EIGHTH YEAR

20.414	Industrial Economic Mgt.	3	.....	Technical Elective	3
.....	Technical Elective	3	.....	General Elective	3
.....	General Elective	<u>3</u>	.....	General Elective	<u>3</u>
		9			9

Technical electives **MUST** be selected from one area of emphasis - Manufacturing, Safety Engineering, or Management. Approved Technical Electives for Area of emphasis follow: (may require prerequisites which automatically qualify as technical electives)

Manufacturing

23.222
23.404
20.203
20.427
27.202
27.401
27.303
23.471

Safety

66.481
20.429
20.430
20.431
20.432
20.433

Management

66.321
66.421
66.426
66.452
69.201
69.410
69.413
69.498

Bachelor of Science in Technology

Industrial Technology - Water and Waste Option

FIRST YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
42.101 College Writing	3	42.102 College Writing & Literature	3
90.113 College Algebra	3	92.115 College Trigonometry	3
60.201 Accounting Principles I	<u>3</u>	60.202 Accounting Principles II	<u>3</u>
	9		9

SECOND YEAR

90.131 Calculus I	3	99.141 Physics I	4
84.111 General Chemistry I	3	90.132 Calculus II	3
84.113 General Chemistry I Lab	<u>1</u>	20.151 Hydraulics for Plant Operations	<u>3</u>
	7		10

THIRD YEAR

20.251 Wastewater Trt. Plant Op. I	3	20.252 Wstwtr. Trt. Plant Op. II	3
20.253 Wastewater Treatment Lab I	1	20.254 Wastewater Treat. Lab II	1
20.225 Water Chemistry I	<u>3</u>	20.152 Water Biology	<u>3</u>
	7		7

FOURTH YEAR

17.127 Electrical Fundamentals	3	20.352 Water Supply & Treatment Operations II	3
17.129 Electrical Fundamentals Lab	1	20.452 Operation & Maintenance of Wastewater Collection Systems	3
20.351 Water Supply & Treatment Operations I	<u>3</u>	42.225 Technical & Scientific Writing	<u>3</u>
	7		9

Industrial Technology - Water and Waste Option

FIFTH YEAR

First Semester (Sept.)		Second Semeste (Jan.)	
Subject No.	Credits	Subject No.	Credits
20.255 Water Distribution Systems	3	20.458 Biological Treatment Process	
20.201 Introduction to Materials	3	Control & Troubleshooting	3
23.221 Statics	3	23.111 Engineering Drawing I	2
	<u>9</u>	20.354 Industrial Waste Treatment	<u>3</u>
			8

SIXTH YEAR

15.123 Surveying I	4	20.353 Water Works Operations Lab I	1
92.383 Introduction to Statistics	3	20.257 Water/Wastewater Plant	
..... Technical Elective	<u>3</u>	Management I	3
	10	20.416 Statistical Quality Control	<u>3</u>
			7

SEVENTH YEAR

15.255 Environmental Eng. I	3	15.356 Environmental Eng. II	3
20.310 Industrial Safety	3	64.201 Economics I	3
66.371 Operations Management I	<u>3</u>	92.209 Introduction to Basic	<u>3</u>
	9		9

EIGHTH YEAR

20.414 Industrial Economic Mgt.	3	 Free Elective	3
..... Technical Elective	3	 Technical Elective	3
..... Area II Elective	<u>3</u>	47.101 General Psychology	<u>3</u>
	9		9

All Technical Electives shall be chosen after conference with the Program Coordinator and **MUST** be approved by him.

Bachelor of Science in Technology

Industrial Technology - Plastics Option

FIRST YEAR

First Semester (Sept.)			Second Semester (Jan.)		
Subject No.		Credits	Subject No.		Credits
42.101	College Writing	3	42.102	College Writing & Literature	3
90.113	College Algebra	3	92.115	College Trigonometry	3
84.121	Chemistry I	3	84.122	Chemistry II	3
		<u>9</u>			<u>9</u>

SECOND YEAR

84.223	Princ. of Organic Chem. I	3	42.225	Tech. & Scientific Writing	3
90.131	Calculus I	3	90.132	Calculus II	3
23.111	Engineering Drawing I	2	47.101	General Psychology	3
		<u>8</u>			<u>9</u>

THIRD YEAR

27.201	Plastics Materials Science I	3	27.202	Plastics Materials Science II	3
99.141	Physics I	4	99.142	Physics II	4
27.401	Processing Technology I	3	27.402	Processing Technology II	3
		<u>10</u>			<u>10</u>

FOURTH YEAR

27.406	Polymer Structures	3	27.303	Reinf. Plastics/Composites	3
27.301	Additives for Polymeric Materials ...	3	66.321	Marketing Principles	3
27.373	Plastics Mold Eng'g I	3	.....	Technical Elective	3
		<u>9</u>			<u>9</u>

Industrial Technology - Plastics Option

FIFTH YEAR

First Semester (Sept.)		Second Semester (Jan.)	
Subject No.	Credits	Subject No.	Credits
92.383 Introduction to Statistics	3	20.416 Statistical Quality Control	3
64.201 Economics I	3	66.451 Personnel Management	3
92.263 Fortran Programming	3	 Area II Elective	3
	<u>9</u>		<u>9</u>

SIXTH YEAR

20.310 Industrial Safety	3	 Free Elective	3
23.221 Statics	3	23.222 Dynamics	3
27.403 Physical Prop. Polymers I	3	27.404 Physical Prop. Polymers II	3
	<u>9</u>		<u>9</u>

SEVENTH YEAR

17.127 Electrical Fundamentals	3	20.407 Instr. & Process Control	3
20.307 Fluid Power Control	3	20.409 Instrumentation Lab I	1
66.371 Operations Management I	3	 Technical Elective	3
	<u>9</u>		<u>7</u>

EIGHTH YEAR

27.407 Plastics Ind. Organization	3	66.452 Industrial Relations	3
..... Technical Elective	3	20.402 Manufacturing Operations	3
..... Free Elective	3	 Technical Elective	3
	<u>9</u>		<u>9</u>

Technical Electives may be chosen from business, computer, engineering technology or other technological programs.

Bachelor of Liberal Arts

Liberal Arts

The Bachelor of Liberal Arts Degree requires a minimum of 120 credits as follows:

6 cr.	English Composition
27 cr.	Area Distribution (see University Requirements for Baccalaureate Studies)
36-45 cr.	Major Concentration
18-24 cr.	Optional Minor
Remaining cr.	Elective Courses

Major Concentration

At present a student may select a concentration in Social Sciences or Human Services. Other concentrations may be offered at a later date.

Students must maintain a 2.20 cumulative average in the area of concentration and must select at least 15 credit hours in 300 level courses or higher.

Students selecting Psychology or Sociology as their concentration must take a 400 level seminar which has as its prerequisites the six courses (18 credits) previously taken in concentration.

Minor (Optional)

A student may select a minor (18 to 24 credits) in one of the following areas:

Humanities

Economics

Computer Science

Mathematics (no courses less than Calculus I with 6 credits in 300 level courses or higher.)

Electives

Electives may be chosen from Economics, Chemistry, Science, Mathematics, Computer Science, Clinical Laboratory Science, Behavioral and Social Science, Fine Arts and Humanities. In addition, the following courses may also be taken: Accounting (60.201, 60.202); and Management (69.201).

Accounting

60.201 Accounting Principles I

Presents a comprehensive and detailed exposure to basic accounting theory. Beginning with the accounting equation, the student is introduced to the accounting cycle, preparation of the Statement of Financial Position and the Income Statement, and accounting for the assets of a firm. One session per week, 3 credits.

60.202 Accounting Principles II

Emphasizes the accounting for corporations, treatment of stockholders equity, earnings and dividends. Examines the Statement of Changes in Financial Position, cash flow causes and effects, and financial statement analysis. One session per week, 3 credits. Prerequisite: 60.201.

60.311 Managerial Accounting

An in-depth examination of the use of accounting systems for managerial decision-making. Budgeting, forecasting, and cost accumulations systems which relate to the manufacturing firm will be studied. One session per week, 3 credits. Prerequisite: 60.202 (For non-accounting majors).

60.362 Business Law I

Principles of commercial law encompassing a study of contracts, agency, employment, commercial paper and sales including the Uniform Commercial Code. One session per week, 3 credits.

60.363 Business Law II

The analysis of the legal principles underlying real and personal property, corporations, partnerships, trusts, and estates. One session per week, 3 credits.

67.301 Intermediate Accounting I

This course examines the generally accepted accounting principles relating to the preparation of financial statements. The student will study in depth the valuation and disclosure problems associated

with the assets of the firm. One session per week, 3 credits. Prerequisite: 60.202.

67.302 Intermediate Accounting II

This course continues the in-depth study of the valuation and disclosure problems associated with corporate liabilities and stockholders equity. Emphasis is placed on the opinions of the Accounting Principles Board and Financial Accounting Standard Board. One session per week, 3 credits. Prerequisites: 67.301.

67.401 Advanced Financial Accounting I

This course explores theoretical and practical problems in accounting for large, multicorporation business entities. Consolidation, mergers, and home office/branch accounting receive in-depth study. One session per week, 3 credits. Prerequisite: 67.302.

67.402 Advanced Financial Accounting II

This course offers a comprehensive study of partnership accounting, accounting for installment and consignment sales, and also includes an introduction to accounting for non-profit organizations (government, educational units and hospitals.) One session per week, 3 credits. Prerequisite: 67.401.

67.411 Cost Accounting I

An examination of the manufacturing function from the view of the cost accountant. Managerial control of the elements of product costs will be studied with an emphasis on cost accumulation systems both historical and estimated. One session per week, 3 credits. Prerequisite: 60.202.

67.412 Cost Accounting II

Topics covered will include standard (estimated) costs, variance analysis, profit planning, cost-volume-profit analysis, and relevant cost analysis for problem solving. One session per week, 3 credits. Prerequisite: 67.411.

67.421 Auditing I

An examination of purposes of financial auditing and operations auditing. The following topics will be examined in depth: auditing, standards, professional ethics, legal responsibilities, internal control, audit evidence, financial statements, disclosures, audit reports, management advisory services, and internal auditing. One session per week, 3 credits. Prerequisite: 67.302.

67.422 Auditing II

An examination of audit procedures as they relate to the various audit segments: i.e. cash, fixed assets,

owners equity, etc. This will be implemented via the use of text material and a comprehensive audit case. Statistical sampling will be covered in depth via the use of text material and cases when available. One session per week, 3 credits. Prerequisite: 67.421.

67.431 Federal Income Taxes

This course deals with the basic rules and regulations of the Internal Revenue Code as it affects the individual and the corporation. An understanding of the code is developed through lectures, assigned readings, research, and the solution to a wide variety of problems. One session per week, 3 credits. Prerequisite: 60.202.

Economics

64.201 Economics (Microeconomics)

A study of the principles governing the production and exchange of goods and services. One session per week, 3 credits. Prerequisite: 90.111.

64.202 Economics II (Macroeconomics)

A study of the principles governing the level of national income and employment. Examination of the commercial banking system, monetary and fiscal policy, the international economy, and alternative economic system. One session per week, 3 credits. Prerequisite: 90.111.

64.307 Government and Business

An examination of the various governmental controls over business in the American economy. One session per week, 3 credits. Prerequisites: 64.201 or 64.202.

68.301 Current Economic Problems

Selected problems which confront the contemporary American economy. One session per week, 3 credits. Prerequisites: 64.201 or 64.202.

68.312 Managerial Economics

An economic approach to management decisions. This subject draws upon economic analysis to help formulate policy in such matters as capital budgeting, multiple product decisions, demand analysis, and competitive action. One session per week, 3 credits. Prerequisites: 64.201 or 64.202 and 90.242.

Banking

69.101 Principles of Banking

This course fulfills the same role as the “Principles of Bank Operations” course it replaces; however, it provides an updated and broader perspective of the banking industry. Principles of Banking touches on nearly every aspect of bank functions. Included is a comprehensive introduction to banking in today’s economy. Discussions on specific topics are presented in an easily accessible form. The language and documents of banking, check processing, teller functions, deposit function, trust services, bank bookkeeping, and bank loans and investments are some primary topics. The course ends with a discussion of the bank’s role in the community. One session per week, 3 credits.

69.102 Bank Management

This course presents trends which have emerged in the philosophy and practice of bank management. The study and application of the principles outlined provides new and experienced bankers with a working knowledge of bank management. It touches on objectives, planning, structure, control, and inter-relationship of various bank departments. One session per week, 3 credits.

69.103 Credit Administration

This course concerns itself with factors influencing and determining loan policy. It is not a “how” and “whether to” guide to granting credit, but discusses methods of credit investigation and analysis, credit techniques, specific credit problems, and regular as well as unusual types of loans. Emphasis is also given to credit department organization and procedures, analysis of financial statements, and the methods of dealing with borrowers in financial difficulty. One session per week, 3 credits.

69.104 Analyzing Financial Statements

This course offers the student tools and techniques necessary for the evaluation of financial condition and operating performance of a modern business enterprise. The course is divided into four parts:

Financial Statement Analysis and Accounting; Financial Statements and Business Funds Flow; Tools of Financial Statements Analysis; and the Technique of Financial Statement Analysis. One session per week, 3 credits. Prerequisite: 60.201.

69.105 Installment Credit

This modular course emphasizes the pragmatic “how-to” details of installment credit. Topics covered are principles of credit evaluation, open-end credit, marketing bank services, collection policies and procedures, legal aspects, financial statement analysis, direct and indirect installment lending, leasing and other special situations, installment credit department management, insurance, rate structure and yields. One session per week, 3 credits.

69.106 Real Estate Finance

This course provides a background in the varied real estate mortgage credit operations of commercial banks. It treats the main areas of real estate by concentrating on the following broad areas: 1) the manner in which funds are channeled into the mortgage markets; 2) the financing of residential property; 3) the financing of special purpose property; and 4) the administrative tasks common to most mortgage departments. One session per week, 3 credits.

69.107 Bank Investments

The objectives of this course are to explain the nature of the more important bank investments, to demonstrate the relationship of investment management to other functional areas of the bank, and to discuss the factors that affect investment strategies and decisions. Emphasis throughout is on the basic principles with which investment personnel should be familiar—fundamentals such as nature of risk, liquidity, and yield; how each is measured; and how they are related. One session per week, 3 credits. Prerequisite: 69.101.

69.108 Trust Functions and Services

This course provides an overview of many of the generally accepted principles of the law of estates, trusts, and agencies as it takes the student on a step-by-step of trust functions and services encountered in the daily operation of a trust department. The appendices of the text contain illustrative instruments including a will, a trust agreement, and an investment management agency agreement. For the student who is not familiar with legal and trust terms, a detailed glossary is included. One session per week, 3 credits. Prerequisite: 69.101.

69.109 Marketing for Bankers

This course presents marketing as a broad concept. It deals with concepts and philosophies of marketing; information, research, and target; the marketing mix (product strategy, distribution strategy, advertising and sales promotion, personal selling, and pricing strategy); and the methods of market planning. One session per week, 3 credits.

69.110 Savings and Time Deposit Banking

This course reflects recognition of the fact that a knowledge of the historical development of savings institutions and awareness of the basic economic function of the savings process are necessary to an understanding of the current operations and policies of these institutions. Different types of financial savings are reviewed in order to describe the system of financial flow from income to capital investment. Interest rates, types of savings accounts, and management of savings institutions are also covered. One session per week, 3 credits.

69.111 Negotiable Instruments and the Payments Mechanism

The objective of this course is to explore the relevant legal implications of normal activities and transactions in bank operations. The treatment is in general terms. It is designed to add knowledge of legal principles and reasoning to the student's understanding and vocational skill and to influence atti-

tudes of bank personnel by providing information about the impact of the law and applicable bank regulations rather than the resolution of legal issues or problems. The aim is to improve understanding of how the law operates within the framework of federal and state banking statutes, court decisions, and administrative regulations. One session per week, 3 credits.

69.112 Corporate Banking

This practical, common sense approach to lending incorporates the exact sequential nature of the lending process, giving bankers a solid foundation on which to construct sound lending practices. One session per week, 3 credits.

69.113 Credit Department Management

This course presents an excellent overall perspective of the credit department. It gives a thorough understanding of the basic principles underlying credit function and strengthens management performance through highly interactive educational format. Topics covered are management, organization, and staffing; credit files, spreading financial statements; the commercial credit analysis function; loan quality control and compliance functions; commercial credit information exchange and the training function. One session per week, 3 credits.

69.114 Branch Management Program

This course is designed to present a comprehensive overview of the branch function and the manager's role in its operation, branch operations and branch lending functions. One session per week, 3 credits.

69.115 Introduction to Commercial Lending

Provides an introductory overview of the commercial lending function and stresses the need for a solid relationship between a bank's commercial customers and the lending officer as well as the importance of commercial loans to a bank's portfolio. One session per week, 3 credits.

Management

66.253 Organizational Behavior

Applications of concepts from the behavioral sciences to individual and group activity organizations. Use of behavioral concepts to introduce and implement organizational change. One session per week, 3 credits. Prerequisites: 47.101, 48.101.

66.321 Marketing Principles

Product planning, distribution, promotion and pricing studied in the context of consumer behavior, governmental constraints and the structure of business institutions. One session per week, 3 credits. Prerequisite: 64.201.

66.331 Business Finance

Principles of financial management, including working and fixed capital sources of funds, financial statements, budgeting and capitalization. One session per week, 3 credits. Prerequisites: 60.201, 64.201, 64.202.

66.332 Money and Banking

Evolution of money and credit and their role in the economy. Monetary policy and the Federal Reserve System. Structure and function of the commercial banking system and the role of other financial institutions. One session per week, 3 credits. Prerequisites: 64.201, 64.202.

66.371 Operations Management I

Principle of production/operations management. Nature and function of production systems; operation planning and control; plant layout; materials handling; inventory and quality control. One session per week, 3 credits. Prerequisite: 90.241.

66.372 Operations Management II

Cases on the application of principles from 66.371 to problems involving continuous, intermittent and job lot production systems for both small and large firms. One session per week, 3 credits. Prerequisite: 66.371.

66.421 Purchasing and Materials Management

Purchasing procedures, inventory control, quality control, source selection, forward buying and speculation for the production enterprise. One session per week, 3 credits. Prerequisite: 66.321.

66.426 Sales Management

Management of the personal selling function. Principles of sales force organization, selection, training, compensation, supervision and motivation are explored via appropriate cases. One session per week, 3 credits. Prerequisite: 66.321.

66.434 Investment Management

Principles of investment: security analysis, portfolio management, market analysis. One session per week, 3 credits. Prerequisite: 66.331.

66.451 Personnel Management

Recruitment, selection and training of the work force. Wage and salary administration, employee health and safety, welfare and education. One session per week, 3 credits. Prerequisite: 69.201.

66.452 Industrial Relations

Human interaction and group behavior in organized industrial settings. Union-management relations, grievance procedures, collective bargaining, and arbitration. One session per week, 3 credits. Prerequisite: 66.451.

66.481 Risk Management and Insurance

Analysis of pure risks of economic loss and evaluation of various methods of dealing with risk. Development and implementation of risk management programs for the business firm. One session per week, 3 credits.

69.201 Principles of Management

Introduction to the principles of management, including the functions of planning, directing, organizing, and control in relation to business. One session per week, 3 credits.

69.410 Current Management Problems in Business and Industry I

Special problems of management in working with personnel of minority groups, blacks, women, ethnic groups and others. Extensive use is made of case studies, group projects and field studies. One session per week, 3 credits.

69.411 Current Management Problems in Business and Industry II

Advance section to 69.410. Complex problems of job boredom, worker alienation and corporate social responsibility. Solutions to these problems and problems in 69.410 will be given in workshop setting. Current relevant case studies with individualized solutions. One session per week, 3 credits. Prerequisite: 69.410.

69.412 Small Business Management Seminar

A course for advanced students to study peculiar problems of small business in operations, marketing, accounting, finance and personnel, with emphasis on contemporary problems, through case problems and readings. Open to students with 72 credits towards the B.S. degree or permission of Program Coordinator. One session per week, 3 credits.

69.414 Business Systems and Procedures

A study of techniques for improved managerial controls and reduction of operating costs through improved systems. Topics covered include increased profits through improved systems, records management, information retrieval, and long range planning for business. One session per week, 3 credits. Prerequisite: 69.201.

69.416 Collective Bargaining Agreement

The nature and content of current bargaining agreements. Included will be the collective bargaining process including negotiations, mediation and arbitration. Case studies in labor management relations involving the entire labor agreement and relationship. One session per week, 3 credits. Prerequisite: 66.452.

69.417 Real Estate

The study of evaluation, legal, financial, and regulatory aspects of real estate management. One session per week, 3 credits.

69.498 Business Policy

An integration of knowledge in the various functional areas of management toward solution of problems affecting the character and success of the total enterprise. Corporate strategy and its implementation via appropriate policies. One session per week, 3 credits. Prerequisite: senior status.

Chemistry

84.111 General Chemistry I

A one semester survey of the principles of inorganic chemistry: the structure of matter, the quantitative aspects of chemical reactions, solution chemistry, including acid-base chemistry and ionic equilibria. One session per week, 3 credits. Corequisite: 84.113.

84.112 General Chemistry II

A survey of the basic principles of organic chemistry and biochemistry with emphasis on biochemical aspects of carbohydrates, lipids, proteins, and nucleic acids. Various metabolic pathways are also emphasized. Primarily for nursing majors. One session per week, 3 credits. Prerequisite: 84.111. Corequisite: 84.114.

84.113 General Chemistry Laboratory I

The laboratory course corequisite with 84.111 with experiments designed to cover the structure of matter, the quantitative aspects of chemical reactions, and solution chemistry, including acid-base chemistry and ionic equilibria. One session per week, 1 credit.

84.114 General Chemistry Laboratory II

Laboratory experiments designed to illustrate the principles discussed in 84.112. Prerequisite: 84.113 or permission of coordinator. One session per week, 1 credit.

84.121 Chemistry I

Class and demonstration. An introduction to the basic concepts of chemistry. Topics include chemical calculations, atomic structures, the periodic table, basic bonding theory, solutions, liquids, gases. One session per week, 3 credits.

84.122 Chemistry II

Class and demonstration. A continuation of 84.121. Topics include thermodynamics, kinetics, acids and bases, introduction to organic chemistry, chemical

equilibrium, precipitation reactions, electrochemistry. One session per week, 3 credits. Prerequisite: 84.121.

84.223 Principles of Organic Chemistry I

Discussions of structure, classification by functionality, nomenclature, synthesis and reactions, mechanisms of reactions of organic compounds. One session per week, 3 credits. Prerequisite: 84.122. Corequisite: 84.225 or permission of coordinator.

84.224 Principles of Organic Chemistry II

A continuation of first semester subject 84.223. One session per week, 3 credits. Prerequisite: 84.223. Corequisite: 84.226 or permission of coordinator.

84.225 Principles of Organic Chemistry Laboratory I

Laboratory work in this course is scheduled to accompany topic presentations in the lecture phase of the course (84.223) and will be devoted to product separation and purification techniques, methods of synthesis of important compounds, and instrumental analytical techniques. One session per week, 1 credit. Corequisite: 84.223.

84.226 Principles of Organic Chemistry Laboratory II

A continuation of the first semester laboratory course, 84.225. One session per week, 1 credit. Prerequisite: 84.225. Corequisite: 84.224.

84.314 Analytical Chemistry II

This course will introduce the student to modern instrumental methods of chemical analysis. Included are such topics as ultraviolet, infrared, nuclear magnetic resonance, emission and atomic absorption spectroscopy. Mass spectrometry, thermal and electrochemical methods of analysis will be discussed. One session per week, 3 credits. Prerequisites: 86.122, 99.143. Corequisite: 84.316. Offered in spring of 1980 and alternate years thereafter.

84.316 Analytical Chemistry II Laboratory

Laboratory experiments designed to compliment the coverage of topics in 84.314. One session per week, 1 credit. Prerequisite: 86.122. Corequisite: 84.314. Offered on alternate years.

84.334 Advanced Inorganic Chemistry

An introduction to modern theories of atomic structure and chemical bonding with emphasis on physical chemical principles and properties. Considerable time will be spent on coordination compounds including topics such as descriptive chemistry, biochemical importance, and ligand field theory. One session per week, 3 credits. Prerequisite: 84.345. Offered on alternate years only.

84.344 Physical Chemistry I

The 84.344-84.345 sequence covers basic physical chemical topics: laws of thermodynamics, solutions, chemical and phase equilibria, electrochemistry, kinetics, atomic and molecular structure. One session per week, 3 credits. Prerequisites: 86.122, 90.132, 99.143. Corequisite: 84.346.

84.345 Physical Chemistry II

See description under 84.344. One session per week, 3 credits. Prerequisite: 84.344. Corequisite: 84.347.

84.346 Physical Chemistry Laboratory I

Laboratory work designed to exemplify the principles covered in 84.344. One session per week, 1 credit. Corequisite: 84.344.

84.347 Physical Chemistry Laboratory II

Laboratory work designed to exemplify the principles of chemical kinetics, equilibrium and spectroscopy. One session per week, 1 credit. Corequisite: 84.345.

86.121 Analytical Chemistry

Class and laboratory. The principles and calculations of gravimetric and volumetric analysis. One session per week, 3 credits. Prerequisites: 84.122, 92.115.

86.122 Analytical Chemistry

Class and laboratory. Advances concepts in wet methods of analysis. One session per week, 3 credits. Prerequisite: 86.121.

86.352 Chemical Applications

A study of the chemical principles applied to one or more areas of industrial technology. One session per week, 3 credits. Prerequisite: 84.345. Offered in spring 1980 and alternate years thereafter.

86.361 Advanced Organic Chemistry

An in-depth coverage of properties and reactions of organic compounds stressing such aspects as synthetic methods and reaction mechanisms. One session per week, 3 credits. Prerequisites: 84.224, 84.345. Not offered in fall 1979. Will be offered in fall 1980 and alternate years thereafter.

86.362 Advanced Organic Chemistry

A continuation of advanced level study of organic compounds stressing synthesis and reaction mechanisms. One session per week, 3 credits. Not offered in spring 1980. Will be offered in spring 1981 and alternate years thereafter.

86.421 Special Topics in Chemistry

An in-depth treatment of one or more areas of advanced chemistry or industrial applications of chemistry. Students enrolling for the course must have the permission of the chemistry coordinator. One session per week, 3 credits.

86.471 Industrial Chemistry

Discussion of essential chemical principles in selected areas of industrial concern, including the effect of industrial processes on the environment. One session per week, 3 credits. Prerequisites: 84.224, 84.345. Offered in fall 1979 and alternate years thereafter.

86.481 Chemistry of High Polymers

The physical and organic chemistry of monomers and polymers, including a consideration on non-bonding forces, spectroscopic methods of structure determination, fractionation and thermodynamics. One session per week, 3 credits. Prerequisites: 84.224, 84.345. Not offered in fall 1979. Will be offered in fall 1980 and alternate years thereafter.

86.482 Chemistry of High Polymers

A continuation of 86.481. Topics presented will include methods of molecular weight determinations for polymers in solution, kinetics of condensation and addition polymerization, and mechanisms of free radical and ionic polymerization. One session per week, 3 credits. Not offered in spring 1980. Will be offered in spring 1981 and alternate years thereafter.

Science

81.111 Principles of Biology I

Introduction to biological systems above the unit organismal level. Study of plants and animals with respect to reproduction and development, behavior, genetics, evolution, ecology and biogeography. One session per week, 3 credits.

81.112 Principles of Biology II

An introduction to the structure and function of biological processes at the sub-cellular, cellular, and organismal levels. Discussions include metabolism, growth, differentiation, and physiology of plants and animals. One session per week, 3 credits.

83.101 Life Science I

An introduction to the study of Biology which considers first the chemical basis of life, and then the earth's environment as a community in which plants and animals live, interact, and demonstrate genetic

variations which enable them to adapt to changes and evolve. One session per week, 3 credits.

**82.161 Emergency Care -
A First Responders Course**

The objective is to provide training in all aspects of immediate emergency medical care required at the scene of an accident or illness. The scope of the course concerns itself with the roles and responsibilities a first responder has at the accident scene. These include medical-legal aspects of rendering emergency care, treating life threatening emergencies including airway care, CPR, control of bleeding and shock; treating accident related injuries including wounds, fractures and burns. Also discussed will be illnesses or conditions such as heart attack, stroke, diabetes, epilepsy, abuse of alcohol and drugs, and childbirth. The student will learn patient examination, diagnosis, and triage; how to gain access to patients using simple handtools; and how to move injured persons. The emphasis of the

training is devoted to the practical aspects of emergency care rendered at the scene. Under Mass. Gen. Law chapter III section 201, all police officers, firefighters and lifeguards not assigned to administrative duties are required to be trained to the first responder level minimally. This course fills both the need of present and future law enforcement officials. This course does not fulfill any portion of the University Area III elective. One session per week, 3 credits.

82.261 & 82.262 Emergency Medical Care I & II

This course provides the necessary knowledge and skill to give emergency medical care at the emergency scene. The curriculum covers the basics of understanding the emergency situation, as well as specialized emphasis in respiration and resuscitation, bleeding, wounds and shock, use and care of emergency equipment commonly accepted and employed such as suction machines, oxygen delivery systems, backboards, fracture kits, obstetrical kits, stretchers of various types and light rescue tools. Also taught are management of mentally disturbed patients, and initial care of poison and burn patients along with environmental emergencies. Included in the course are lectures on anatomy and physiology by local physicians. Successful completion of the course entitles one to take the National Registry Exam for Emergency Medical Technician. One session per week, 3 credits.

89.101 General Geology I

A study of the earth with emphasis on earth materials, earth structure (crustal and internal), earth history and the development of life. Gives the general student an understanding of the dynamic earth and provides a foundation for advanced work. One session per week, 3 credits.

89.102 General Geology II

A continuation of 89.101, with emphasis on the surface of the earth and landform development. Includes special topics, introducing the student to

recent geological research and applied geological knowledge. Designed for the general and continuing student. One session per week, 3 credits. Prerequisite: 89.101.

94.341 Fundamentals of Science I

A study of the basic concepts of science. Topics to be covered include: the influence of the scientific method in understanding science, energy and motion. Newtonian physics, fluids and waves, kinetic theory of matter, and electricity. Methods of scientific calculations will be treated. One session per week, 3 credits.

94.342 Fundamentals of Science II

A continuation of the study of the basic concepts of science. Topics to be covered include: electricity and magnetism, light, meteorology, atoms and molecules, theory of the atom, the Periodic Law, crystals, ions and solutions, chemical reactions, acid-base theory, and basic organic chemistry. This may be taken before or after 94.341. One session per week, 3 credits.

99.141 Physics I

Class and laboratory. The principles of statics and dynamics, including equilibrium of a particle and of a rigid body, motion in one dimension and in the plane, particle dynamics and gravitation, work and energy, impulse and momentum. One session per week, 4 credits. Some Friday night classes will be required. Corequisite: 92.115.

99.142 Physics II

Class and laboratory. Rotational dynamics, elasticity, harmonic motion, hydrostatics, hydrodynamics. Thermodynamics, including temperature, heat, heat capacity, ideal gas, first and second laws of thermodynamics. One session per week, 4 credits. Some Friday night classes will be required. Prerequisite: 99.141. Corequisite: 90.131.

99.143 Physics III

Class and laboratory. Wave motion and wave phenomena. Optics, including reflection, refraction, geometrical optics, interference and diffraction.

Electrostatics, including Coulomb's Law, electric field, and electric potential. Introduction to atomic and nuclear physics. One session per week, 4 credits. Some Friday night classes will be required. Prerequisite: 99.142, Corequisite: 90.132.

Mathematics

All mathematics courses, including those designated as Computer Science, except 90.010 and 90.111 are transferable to the University of Lowell day division upon appropriate University approval. Courses with the prefix 92 are equivalent to those in the day school with the same number. Day school students wishing to elect courses with the prefix 90 must consult the Chairperson and/or Coordinator in order to ascertain course equivalence.

90.010 Introductory Mathematics*

A transitional course designed for students with a limited mathematics background. The main purpose of this course is to give students an insight into the structure of basic mathematics including algebra, and to increase the student's manipulative skills in this area. One session per week, 3 credits.

90.111 Fundamentals of Algebra*

This course is intended for students with little or no background in basic algebra or whose background is not current. Topics covered include; the real number system, factoring, fractions, linear equations, functions, graphs, systems of equations and the quadratic equation. One session per week, 3 credits.

90.112 College Algebra for Management Science I

This course is intended for students whose background in basic algebra is current. The emphasis is on applications to the management and the social sciences. Topics covered include: an introduction to set notation, equations, inequalities, functions and matrices. Credit is not given for both 90.112 and 90.113. One session per week, 3 credits. Prerequisite: 90.111 or satisfactory score on the Math Placement Exam.

90.113 College Algebra

This course is intended for students whose background in basic algebra is current. The course objective is to provide students with the problem solving and computational techniques needed for further coursework and in their occupation. Topics covered include: quadratic equations, functions, transformations, inequalities, systems of equations and the exponential and logarithmic functions. Credit is not given for both 90.113 and 90.112. One session per week, 3 credits. Prerequisite: 90.111 or satisfactory score on the Math Placement Exam.

92.115 College Trigonometry

Angles and their measure, the trigonometric functions, solving triangles, law of sines, law of cosines, circular functions and their graphs, trigonometric identities. One session per week, 3 credits. Prerequisite: 90.113.

*Please note that 90.010, 90.111 are not usable as electives in many degree programs.

**90.119 College Algebra for
Management Science II**

A continuation of 90.112. Topics covered include quadratic functions, the mathematics of finance, linear programming, optimization and an introduction to differential calculus. One session per week, 3 credits. Prerequisite: 90.112.

90.131 Calculus I

A first course in Calculus dealing with a brief review of Analytic geometry and trigonometry. The course progresses to the study of limits, derivatives, rules for differentiation of algebraic and transcendental function; chain rule, implicit differentiation, continuity, related rate problems, max. min problems, and curve sketching. One session per week, 3 credits. Prerequisite: 92.115.

90.132 Calculus II

A continuation of 90.131. The course covers integration, rectilinear motion, sigma notation, area, area between two curves, volumes by disc and shell methods, length of a plane curve and surface area, natural logarithm, the exponential function, hyperbolic functions, inverse functions and inverse trigonometric functions, integrals and derivatives of the inverse trig. functions, and integration formulas. One session per week, 3 credits. Prerequisite: 90.131

90.221 Applied Linear Algebra I

An introduction to sets and mathematical logic. The basic properties of linear mappings, matrices, scalar products and orthogonality, systems of linear equations. Applications of the above. One session per week, 3 credits. Prerequisite: 90.231 or permission of coordinator.

90.222 Applied Linear Algebra II

Matrices and bilinear forms; symmetric, hermitian and unitary operators, eigenvectors and eigenvalues; the Caley Hamilton, Sylvester and Spectral Theo-

rems. Applications of the above. One session per week, 3 credits. Prerequisite: 90.221.

90.231 Calculus III

A continuation of Calculus II. This course covers integration by parts, integration of trigonometric integrals, trigonometric substitution, partial fraction, numeric integration, improper integrals, L'Hopital's Rule, indeterminate forms, sequences, infinite series, integral test, comparison tests, alternating series tests, power series, Taylor series, polar coordinates, graphs and areas in polar coordinates and parametric equations. One session per week, 3 credits. Prerequisite: 90.132

90.232 Calculus IV

A continuation of Calculus III. This course covers vector calculus, curvature, cylindrical surfaces, dot and cross products, curves and planes in three space, cylindrical and spherical coordinates, functions of two variables, chain rule, directional derivatives and gradient, tangent planes and functions of n variables, a double and triple integrals in rectangular, polar, cylindrical and spherical coordinate systems. One session per week, 3 credits. Prerequisite: 90.231.

90.241 Statistics for Business I

Descriptive statistics, sophisticated counting techniques and other components of probability, simple random variables and their distributions, bivariate functions, sampling theory, properties of estimators, confidence intervals, and hypothesis testing. One session per week, 3 credits. Prerequisites: 90.112 or 90.113.

90.242 Statistics for Business II

Analysis of variance, applied regression theory, correlation analysis, and other selected topics. One session per week, 3 credits. Prerequisite: 90.241.

92.234 Differential Equations

A course in ordinary differential equations including

equations of order one, linear differential equations, non-homogeneous equations, method of undetermined coefficients, the Laplace transform, systems of equations, electric circuits and network, existence and uniqueness of solutions, and nonlinear equations. One session per week, 3 credits. Prerequisite: 90.231.

92.301 Introduction to Applied Mathematics I

Matrices. Vector analysis, review of vector algebra, vector calculus, divergence theorem. Green's theorem and Stokes' theorem. One session per week, 3 credits. Prerequisite: 90.232.

92.302 Introduction to Applied Mathematics II

Series solutions of ordinary differential equations. Bessel functions, Legendre functions. Ordinary differential equations, boundary value problems, Fourier series and integrals. Partial differential equations of physics and engineering, separation of variables. One session per week, 3 credits. Prerequisite: 92.234.

92.305 Introduction to Real Analysis I

Some set theory including equivalence and countability. An axiomatic introduction to the real number system. Sequences of real numbers including boundedness, monotonicity, convergence, divergence. Series of real numbers including convergence, divergence, absolute convergence. Limits and continuity of real functions of a real variable. Metric spaces including open sets, closed sets, limits of sequences, limits and continuity of functions, connected sets, compact sets, bounded sets, totally bounded sets, completeness, continuous functions on compact sets, the Intermediate Value Theorem, uniform continuity. One session per week, 3 credits. Prerequisites: 90.221, 90.231.

92.306 Introduction to Real Analysis II

The calculus of Newton & Leibnitz including the

Rieman integral, averages of a function, the derivative, the Fundamental Theorems of Calculus, the Mean Value Theorem. Sequences and series of real valued functions of a real variable including pointwise convergence, uniform convergence, integration and differentiation. The Weierstrass Approximation Theorem and the Stone-Weierstrass Theorem. Lebesgue measure including measurable sets, non-measurable sets, measurable functions. The Lebesgue integral including the The Lebesgue Dominated Convergence Theorem, Fatou's Lemma, and the metric space $L^2[a, b]$. One session per week, 3 credits. Prerequisite: 92.305.

92.307 Probability and Mathematical Statistics I

Probability functions and densities, expectations. Moments of probability distributions. Central Limit Theorem. One session per week, 3 credits. Prerequisite: 90.232.

92.308 Probability and Mathematical Statistics II

Sampling, decision theory, estimation, hypothesis testing, regression and correlation. One session per week, 3 credits. Prerequisite: 92.307.

90.315 Partial Differential Equations I

Basic concepts in partial differentiation. Classification and solution of first order and higher order linear partial differential equations. Introduction to Bessel, Legendre, and other orthogonal functions. Boundary value problems, including application of Fourier Series, Fourier Integrals, and Laplace Transforms. One session per week, 3 credits. Prerequisite: 92.234.

92.321 Discrete Structures I

Propositional logic, connectives, rules of inference, quantifiers. Proofs, proof by contradiction, induction, applications in computer logic and proofs of program correctness. Algebra of sets, relations on sets, equivalence relations, functions, composition,

one-to-one, onto, orderings, applications to data structures and topological sorting. Matrices, solution sets for systems of matrix operations, eigenvalues and eigenvectors, diagonalization and Jordan canonical form. One session per week, 3 credits. Prerequisite: 90.112 or 90.113 or equivalent.

92.322 Discrete Structures II

Algebraic structures, sets with operations, associative, commutative, and distributive operations, modular arithmetic, electronic privacy and signature. Groups and semigroups, group axioms, permutation groups, cosets, normal subgroups, sequential machines. Directed and undirected graphs, paths, circuits, reachability and connectedness, decision trees, balanced trees, polish notation and trees, graph scheduling problems, flow in network, data structures. Lattices and Boolean Algebra, switching theory, logic design. Finite fields, representation and structure, minimal and irreducible polynomials, primitive elements, polynomial roots, error-correcting codes, public security key systems. One session per week, 3 credits. Prerequisite: 92.321.

92.362 Numerical Analysis I

Theory and applications of numerical techniques including: error analysis, non-linear systems of equations, matrices, eigenvalues, interpolation and collocation of polynomials, numerical integration. Computer solutions are emphasized. One session per week, 3 credits. Prerequisites: 92.263, 90.231.

92.360 Introduction to Data Structures

Basic concepts of data. Linear lists, strings, arrays, and orthogonal lists. Trees and graphs. Storage systems and structures. Storage allocation and collection. Multilinked structures. Symbol tables, searching and sorting (ordering) techniques. One session per week, 3 credits. Prerequisites: 92.321, 92.265.

92.381 Introduction to Operations Research Techniques I

The use of decision models in industrial systems. Fundamentals of probability and matrix theory. Critical path methods. Linear programming. The simplex method. Sensitivity analysis. Goal programming. Transportation and assignment models. Integer programming. One session per week, 3 credits. Prerequisite: 90.132.

92.382 Introduction to Operations Research Techniques II

A continuation of 92.381. Topics include: inventory control models, Markov analysis, queuing models, dynamic programming, network analysis, and simulation techniques. One session per week, 3 credits. Prerequisite: 92.381.

92.383 Introduction to Statistics

Sets and probability laws, random variables, mathematical expectations, measure of central tendency and variance. Study of discrete and continuous probability distribution, sampling theory, tests of hypothesis. Regression and correlation. (May not be used to satisfy mathematics major requirements. Primarily for students who want a one semester introduction to statistics. Students who wish a more detailed development of statistics and probability are advised to take the sequence 92.307, 92.308.) One session per week, 3 credits.

92.411 Complex Variables I

Complex numbers. Functions of a complex variable. Mappings. Derivatives. Analytic functions. Elementary functions. Integrals. Laurent series. Residues and poles. Contour integration. One session per week, 3 credits. Prerequisite: 90.232.

92.412 Complex Variables II

Transformations. Conformal mappings. Boundary conditions. Application in heat conduction, electrostatic potential, and fluid flow. Gamma and beta

functions. Inverse LaPlace transform. Reimann surfaces. One session per week, 3 credits. Prerequisite: 92.411.

92.421 Abstract Algebra I

Elementary group theory, groups, cosets, normal subgroups, quotient groups, isomorphisms, homomorphisms, series of groups, the Sylow theorems, free groups and homology groups. One session per week, 3 credits. Prerequisite: 90.132.

92.422 Abstract Algebra II

Elementary ring and field theory, quotient rings and ideals, homomorphisms of rings, rings of polynomials, algebraic extensions, automorphisms of fields, separable extensions. Galois Theory. Introduction to categories and functors. One session per week, 3 credits. Prerequisite: 92.421.

92.442 Boundary Value Problems

The Fourier series as a tool of analysis. Orthogonal functions, convergence tests, the Fourier integral, partial differential equations of physics and engineering, and boundary value problems. One session per week, 3 credits. Prerequisite: 90.315.

92.454 Numerical Analysis II

Continuation of 92.362 including: numerical solution of ordinary and partial differential equations, boundary value problems, curve-fitting, linear programming, error analysis and computer solutions. One session per week, 3 credits. Prerequisite: 92.362.

92.465 Formal Languages

This course will study the formal or abstract properties of (computer) languages and of acceptors/recognition for valid expressions in the syntax of the languages. Topics to be covered will include: The Chomsky hierarchy of languages, Finite State Machines: their basic properties/results and as acceptors for Regular Expressions. Two-way

Acceptors and Automata, Pushdown Automata: acceptors for Context Free Languages and grammars for Pushdown Automata. Context Free Grammars. Transformations on grammars and canonical forms for grammars. Syntax Analysis: Top-down, bottom-up and precedence analysis. Parsing. Turing Machines. One session per week, 3 credits. Prerequisite: 92.265 or 92.453.

92.466 Theory of Computation

Models of computation. Turing machines and Turing-computable functions. Other models of computation. The Church-Turing thesis. Universal machines. Recursive functions, primitive recursive and partial recursive functions. Simulation of various computations. Recursive and recursively enumerable sets. Unsolvable problems: Computable versus non-computable functions. Halting problem, equivalence problem, word problems, etc. Other topics as time and interest permit. One session per week, 3 credits. Prerequisite: 92.265 or 92.453.

92.471 Introduction to the Design and Analysis of Algorithms

Basic steps in developing an algorithm, correctness, algorithm design techniques such as hill climbing, subgoals, heuristics, backtracking, branch and bound, recursion, sorting and searching, paging, parallelism, algorithm and program correctness, measures of algorithm efficiency, complexity and overall effectiveness. One session per week, 3 credits. Prerequisite: permission of coordinator.

92.498 Mathematics Seminar

Student reading, writing, and criticism of topics from current literature. Review of some important elements of undergraduate work. One session per week, 3 credits. Prerequisite: permission of coordinator.

Computer Science

Students registering for programming courses will be required to spend non-class time at the University's Computer Center.

92.209 Introduction to Basic

An introduction to the processing of information by computer. Computer logic, memory, inputs and outputs, timesharing, flow-charting techniques, and programming in the Basic Language. This course is for students with no prior programming experience. One session per week, 3 credits. Prerequisite: 90.111 or equivalent. Credit given for only one of 92.209 and 92.219.

92.219 Basic Programming

Programming in Basic, including nested loops, subscripted variables, string manipulation, subroutines and advanced programming techniques. Prerequisite: 90.111 and working knowledge of some other programming language. One session per week, 3 credits. Credit given for only one of 92.209 and 92.219.

92.263 Fortran Programming

Programming principles of Fortran including input-output, arithmetic and control statements; arrays, functions and subroutines. Structures programming will be emphasized. Students will process several problems on the Cyber 71. One session per week, 3 credits. Prerequisite: 90.112 or 90.113.

92.265 Introduction to Pascal

An introduction to computer programming including the elements of algorithm design and data structures. The Pascal language will be used. Topics covered include: algorithm development by step-wise refinement, language control structures, functions and procedures, the standard data types, scalar data types, and an introduction to structured types. The student will process a number of programs on the University computer. One session per week, 3 credits.

92.360 Introduction to Data Structures

Basic concepts of data. Linear lists, strings, arrays and orthogonal lists. Trees and graphs. Storage systems and structures. Storage allocation and collection. Multilinked structures. Symbol tables, searching and sorting (ordering) techniques. One session per week, 3 credits. Prerequisites: 92.265, 92.321.

92.363 SPSS

This course will deal with the computer analysis of data, derived from research conducted primarily in the social, behavioral, and life sciences. The course will include such topics as: data presentation, organization and coding; SPSS system, developing SPSS input deck with various control and procedure cards, generating SPSS files; data modification, recoding and transformation of data; file manipulation, producing input/output files, deleting, retaining, adding variables, etc.; various statistical procedures, from descriptive statistics to more complex multivariate statistics. Data sets including completed questionnaires, will be issued to students for practice in working with the SPSS system and for use in performing various functions, from encoding data to complete statistical analyses. One session per week, 3 credits. Prerequisite: knowledge of basic statistics.

92.364 Problem Solving With Pascal

This course is designed to be a practical problem solving course, to give students further exposure to the topics covered in 92.265, and to provide the tools needed for software development. The course emphasizes these aspects of the programming problem solving process: problem specification and organization, algorithms, coding, debugging, the elements of good programming style and the means of producing a high quality finished product. Programming examples are chosen to span a wide range of both numeric and non-numeric applications. One session per week, 3 credits. Prerequisite: 92.265.

92.365 Cobol Programming I

Programming principles of COBOL, the Common Business Oriented Language; identification, environment, data, and procedures divisions, introduction to compilation procedures and diagnostic processing. Programming of basic business applications such as inventory and accounting problems. One session per week, 3 credits. Prerequisite: 92.209.

92.366 Advanced Fortran Programming

Advanced Fortran programming techniques including multi-dimensional arrays, all Fortran data types, character data, file manipulations, and advanced subprogram techniques. An indepth treatment of such fundamental concepts as data storage, subprogram argument passing, and multi-dimensional array addressing. Additional topics include testing and debugging, numerical operating system, and implementation of algorithms. One session per week, 3 credits. Prerequisite: 92.263.

92.367 Assembly Language Programming I

Absolute machine language coding and the symbolic programming language; the coding of practice problems on a high-speed digital computer using the basic computer instructions including arithmetic, input-output, logic, control operations and data manipulation. One session per week, 3 credits. Prerequisites: 92.209, 92.263.

92.368 Cobol Programming II

A continuation of 92.365. Advanced programming problems in COBOL, discussion of COBOL systems software, sophisticated routines and generalized business file manipulation. One session per week, 3 credits. Prerequisite: 92.365.

92.457 ADA

An introduction to the syntax and semantics of the programming language ADA, including data structures and types, control structures, tasks, packages

and generics. Practical exercises involving the language will be included. One session per week, 3 credits. Prerequisite: 92.265.

92.461 Systems Simulation and Modeling

Procedures in model construction and computerized simulation, modeling tools and techniques, model conceptualization and implementation, selected applications of simulation. One session per week, 3 credits. Prerequisite: 92.263, 92.383.

92.462 Systems Programming

Basic concepts of assembly programs and compilers, macro-generators, utility programs, supervisions, monitors and high level languages. One session per week, 3 credits. Prerequisites: 92.367.

92.463 Systems Design and Development I

A general study of the design and development of computer-oriented data processing systems including: the approach requirements of the system, developing the solution, data controls, system controls, system evaluation and reporting to management. One session per week, 3 credits. Prerequisite: 92.367.

92.464 System Design and Development II

A continuation of 92.463 including: finalizing and implementing the system, post-installation evaluation and interdepartmental coordination, case studies. One session per week, 3 credits. Prerequisite: 92.463.

92.467 Assembly Language Programming II

A continuation of 92.367. Symbolic programming using advanced techniques including macro instructions, indirect addressing, file generation and processing, magnetic tape and magnetic disk applications. One session per week, 3 credits. Prerequisite: 92.367.

92.468 Minicomputer Principles and Applications

Current minicomputer practices covering both hardware and software including basic minicomputer instruction sets, operating systems, assembler and I/O programming, utilities, interrupts, and interfaces. Scientific, industrial and business applications throughout. One session per week, 3 credits. Prerequisites: 92.367, 90.132.

92.469 Compiler Construction Techniques

Typical compiler organization is studied including symbol tables, various types of scans, object code generation, error diagnostics, and optimization techniques. Segments of a classroom compiler are written by students. One session per week, 3 credits. Prerequisites: 92.367, 92.360.

92.470 Data Communications

Analysis and use of remote computing systems including time-sharing remote batch and real-time systems. Design characteristics, applications, data communication, economics and management of such systems. One session per week, 3 credits. Prerequisites: 92.265, 92.360.

92.474 Data Base Concepts

An introduction to data base directives, design element of 3 data bases, architectures, and commercial data bases will be presented. Students will participate in design of a large scale data base application. Administration of the data base. Students will program the basic concepts on a machine. Prerequisites: 2 semesters of higher level language, excluding Basic. One session per week, 3 credits.

92.476 Computer Organization

This course will cover much of the computer architecture knowledge necessary for the software engineer. Students are introduced to the representation of information and to the concepts of gates and elementary logic. Storage mechanisms and memory organizations are described and a functional layout of an elementary computer is given. Addressing methods are explained and various methods of I/O are discussed. The course is filled out with discussions covering microprocessors, large computers, parallelism, and distributed logic. One session per week, 3 credits. Prerequisites: 92.265, 92.367.

92.477 Management Information Systems I

Analysis and evaluation of third generation integrated software systems including hardware for requirements, routine and demand reports, architectural evaluation for integrated business function control and the data base design. One session per week, 3 credits.

92.478 Management Information Systems II

Automated decision-making models, systems user consideration, the economics of MIS, detailed case studies of large scale MIS including effects on management organization, personnel and data management. One session per week, 3 credits. Prerequisite: 92.477.

Civil Engineering Technology

15.123 Surveying I

Class and laboratory. Principles of data gathering by surveying processes. Theories and methods of instrumental techniques for measurement of length, directions, coordinates, areas, volumes and topographic data. Introduction to and use of electronic distance measuring equipment. Problems are used to illustrate processing of field work data. Illustrative fieldwork projects to give facility in basic surveying techniques. One session per week, and five Saturdays of fieldwork, 4 credits. Prerequisites: 92.115, 23.111.

15.124 Surveying II

Class and laboratory. A continuation of 15.123. Application of basic surveying techniques of engineering problems implicit in transportation engineering, industrial and domestic housing, utilities for the safety and convenience of humans, use of land resources and the supply and control of water. Fieldwork projects typical of the applications of surveying to engineering. One session per week, and five Saturdays of fieldwork, 4 credits. Prerequisite: 15.123.

15.237 Statics

The fundamentals of statics, including such topics as force systems, resultants, equilibrium, friction, first moments of masses and areas. One session per week, 3 credits. Prerequisites: 90.132, 99.141.

15.238 Dynamics (CE)

Laws of kinematics of particles and rigid bodies involving absolute and relative motion. Newton's law as applied to the kinetics of rigid bodies in motion. Principles of work and energy; impulse and momentum. One session per week, 3 credits. Prerequisite: 15.237; or 23.221.

15.239 Strength of Materials

Principles of strength of materials, centric, torsional and flexural loading, principal stresses. Mohr's

stress cycle strain, temperature effects, shear and moment diagrams. One session per week, 3 credits. Prerequisite: 15.237; or 23.221.

15.242 Steel Design I

The selection and proportioning of structural steel members to resist axial, shearing, bending and combined stresses. The design of simple riveted, bolted and welded connections. Use of current AISC Specifications and Commentary. One session per week, 3 credits. Prerequisites: 15.251, 15.239.

15.243 Construction Materials

Class and laboratory. Properties of materials used in engineering highways and structures. Discussion of metals, timber, cement, mortars, concrete aggregates, oils, asphalts, and other building materials. One session per week, 3 credits. Prerequisite: 99.142. Corequisite: 15.239.

15.246 Introduction to Hydraulics

Properties of fluids, principles of hydrostatic pressure, fluid flow with applications to orifices, tubes, weirs, and pipes. Two demonstration laboratory sessions will be held during the semester. One session per week, 3 credits. Prerequisites: 15.239; 15.238 or 23.222.

15.251 Structural Analysis I

Analysis of statically determinate structures. Reactions and stresses, framed structures, beams, trusses, graphic statics, roof trusses, truss and girder bridges, long span bridges, and lateral bracing and portals. One session per week, 3 credits. Prerequisite: 15.239.

15.253 Reinforced Concrete I

The selection and design of reinforced concrete members to resist axial, shearing, bending and combined stresses by the Working Stress Design method and the Strength method. Design of rec-

tangular beams, T-beams, and slabs. Use of current ACI Specification and Commentary. One session per week, 3 credits. Prerequisites: 15.251; 15.239 or 23.223.

15.254 Soil Mechanics I

An elementary treatment of the physical properties of soils such as bearing and shearing strengths, soil moisture content, compressibility, consolidation, and settlement. The applications of such soil properties to typical foundations as piles, caissons, and spread footings. One session per week, 3 credits. Prerequisites: 15.243, 15.239.

15.255 Environmental Engineering I

Class and laboratory. The chemistry and biology of water and wastewater including the water treatment process design and water and wastewater laboratory analysis. One session per week, 3 credits. Prerequisites: 90.131, 15.124.

15.257 Highway Elements

An integral presentation of the broad field of basic highway principles covering highway administration, economics and finance, planning, design, soils, drainage, earthwork operations, pavement, surface types, cements, and highway maintenance. One session per week, 3 credits. Prerequisite: 15.124.

15.352 Structural Analysis II

A continuation of 15.251. Deflection calculations for beams, trusses, and frames. Analysis of trusses, beams, and frames by energy methods and moment distribution. Solution of trusses and frames by the SAP IV digital computer program. One session per week, 3 credits. Offered in odd years only. Prerequisite: 15.251.

15.356 Environmental Engineering II

Class and laboratory. A continuation of 15.255 with emphasis on pipe design, domestic wastewater treatment processes and their design, industrial

waste treatment, and stream pollution. One session per week, 3 credits. Prerequisites: 15.255, 15.246. Offered in odd years only.

15.383 Steel Design II

A continuation of 15.242. Design of beam-columns, moment-resisting connections, built-up plate girders, and composite beam and slab sections. Consideration of basic structural members as elements within frame and floor systems. One session per week, 3 credits. Prerequisite: 15.242. Offered in odd years only.

15.391 Reinforced Concrete II

A continuation of 15.253. The analysis of and design for the behavior of the basic concrete members in structural frames and floor systems. The use of design curves and graphs as an aid to the solution of practical problems. One session per week, 3 credits. Prerequisite: 15.253. Offered in even years only.

15.392 Soil Mechanics II

A continuation of 15.254 with emphasis on application of principles. The use of field and laboratory tests in the design of foundation and the treatment of embankments. One session per week, 3 credits. Prerequisite: 15.254. Offered in odd years only.

15.394 Soil Mechanics Lab

Common soil laboratory tests including soil classification gradation, atterberg limits, strength and compressibility tests. One session per week, 1 credit. Prerequisite: 15.254. Offered in even years only.

15.463 Construction Engineering

A descriptive and analytical study of methods and equipment used in the planning and execution of construction projects; the critical path method of scheduling. One session per week, 3 credits. Offered in even years only. Prerequisites: 15.243, 15.257.

15.486 Transportation Elements

A continuation of 15.257. Presentation of selected topics in the field of transportation such as traffic, integrated public transportation, planning and developmental impact of transportation routes. One session per week, 3 credits. Prerequisite: 15.257. Offered in even years only.

15.495 Civil Engineering Elective

Advanced topics from the sub-disciplines of Civil Engineering; that is, structures, transportation, sanitary engineering or soil mechanics. Offered at student request and conditional on sufficient enrollment. One session per week, 3 credits. Prerequisites: Completion of the required courses in the sub-discipline in which course is offered.

Electronic Engineering Technology

17.127 Electrical Fundamentals

An introduction to the basic principles of electrical engineering, including the concept of voltage, current, resistance, inductance, and capacitance; Ohm's Law and Kirchhoff's Laws; Thevenin's and Norton's theorems; laboratory instruments. Alternating current concepts; Frequency response and filters; Diodes; Transistors and electronic amplifiers. Also included is an introduction to number systems and digital logic, both combinational and sequential circuits. Not available for EET majors. One session per week, 3 credits. Prerequisites: 90.115, 99.141.

17.128 Basic Electronics

A continuation and elaboration of the topics covered in 17.127. Topics include digital logic, both sequential and combinational circuits, operational amplifiers, power supplies, feedback and control systems, magnetics and electromechanics, AC power systems, rotating machines, and signal processing and communication systems. Not available for EET majors. One session per week, 3 credits. Prerequisite: 17.127.

17.129 Electrical Fundamentals Laboratory

An introduction to basic laboratory instruments and electronic components. Resistors, inductors, and

capacitors; meters; cathode-ray oscilloscopes; power supplies, oscillators, and signal generators; bridges; and semiconductor characteristics and applications. Written reports are required. Not available for EET majors. One session per week, 3 credits. Corequisite: 17.127.

17.223 Electric Circuits I

Units of voltage current and resistance; voltage and current sources; charge; energy and power; resistance of conductors; Kirchhoff's laws; basic network theorems; fundamentals of magnetism; magnetic circuits; and meters. One session per week, 3 credits. Prerequisites: 90.131, 99.142 (both may be taken concurrently).

17.224 Electric Circuits II

A continuation of 17.223. Inductance and capacitance, simple inductive and capacitive circuits; alternating current and voltage; phasor algebra; inductive and capacitive reactance; impedance and admittance; passive networks; equivalent networks and sources; dependent sources; power in alternating-current circuits; resonance; transformer principles; and polyphase circuits. One session per week, 3 credits. Prerequisites: 17.223, 90.132 (may be taken concurrently).

17.225 Electric Circuits III

An extension and elaboration of the principles covered in 17.223, and 17.224. Analysis of circuits and systems undergoing transient conditions caused by a variety of excitations, both natural and forced, utilizing the Laplace-Transform method. Application to mechanical, fluidic, thermal circuits and filters are presented as an introduction to electromechanical electronic and control systems. One session per week, 3 credits. Prerequisite: 17.224.

17.237 Electronics Laboratory I

An introduction to basic laboratory instruments and electronic components. Resistors, inductors, and capacitors; meters; cathode-ray oscilloscope; power supplies; oscillators; and signal generators; bridges; and semiconductor characteristics and applications. Written reports are required. One session per week, 1 credit. Prerequisite: 17.224.

17.240 Electromechanics

An introduction to magnetic circuits, transformers, alternating current machines and direct current machines. One session per week, 3 credits. Prerequisite: 17.224.

17.350 Control Systems I

An introduction to linear servomechanism theory; dynamic analysis of linear systems; Laplace transform; dynamic response of physical systems, and complex plane analysis; automatic feedback control; and stability analysis. One session per week, 3 credits. Prerequisites: 17.225, 90.132, 99.142.

17.359 Electronics Laboratory II

Experiments on solid-state devices and circuits, analog and digital, are performed with emphasis on their fundamental operation and application. Written laboratory reports are required. One session per week, 1 credit. Prerequisites: 17.237, 17.240, 17.351 or 17.362.

17.360 Electronics Laboratory II

Students are required to perform state-of-the-art experiments related to the latest solid-state devices (both analog and digital) available. Use of the computer as a tool to solve experimental problems is encouraged. A final examination (both oral and written) and several written laboratory reports are required. One session per week, 1 credit. Prerequisites: 17.359, and 17.352 or 17.363.

17.361 Project Laboratory A

Possible projects are outlined and discussed. Students submit detailed proposals. The best feasible projects are then assigned to teams of students for implementation. Use of the computer as a tool to solve experimental problems is encouraged. One session per week, 1 credit. Prerequisites: 17.360, and 17.353 or 17.364.

17.351 Electronics I

Introduction to electronic signals and systems, tow-port networks, amplifiers, frequency response, operational amplifier characteristics and circuits, diode characteristics and applications, rectifiers, power supplies and filtering, limiters, comparators, waveform generators, junction field-effect transistors (JFETs), graphical analysis, small-signal equivalent circuits, biasing multistage amplifiers. One session per week, 3 credits. Prerequisites: 17.224, 90.132, 99.142.

17.352 Electronics II

A continuation of 17.351 Electronics I, metal-oxide-semiconductor field-effect transistors (MOSFETs), bipolar junction transistors (BJTs), single and multistage amplifiers, frequency response, feedback, analog integrated circuits, filters and oscillator circuits. One session per week, 3 credits. Prerequisite: 17.351.

17.353 Digital Electronics

An introduction to the building blocks and concepts associated with digital electronic circuits, combinational and memory devices and circuits, analog-to-digital conversion, microprocessor concepts, logic families, RTL, IIL, TTL, ECL, CMOS, read-only memories (ROMs), static and dynamic MOS random access memories (RAMs), charge-coupled device memories (CCD), programmable logic array (PLAs), multiplexers. One session per week, 3 credits. Prerequisite: 17.352.

17.365 Applied Linear Devices

The linear and non-linear applications and the characteristics of linear integrated devices will be studied. Optimal use of industry published specifications, application notes, and handbook data will be stressed. Topics include: Operational Amplifiers, Regulators, Comparators, Analog Switches, Time Function Generators, Instrumental Circuits, Logarithmic Circuits, Computing Circuits, and Signal Processing Circuits. One session per week, 3 credits. Prerequisites: 17.350, 17.353 or 17.364, 17.372.

17.366 Applied Digital Devices

The characteristics and applications of digital integrated devices, data acquisition, and data conversion. Topics include: analog-to-digital and digital-to-analog converters, sample and hold modules, logic families (TTL, CMOS, ECL, MECL, etc.), large scale integrated circuits (ROM's, RAM's, etc.) One session per week, 3 credits. Prerequisites: 17.372, and 17.364 or 17.353.

17.371 Logic Design I

A study of number systems, switching algebra and combinational logic. Topics include: number systems; coding; switching algebra; minimization and decomposition of switching functions using maps, tabular procedures and charts; basic logical gates and block diagrams; bilateral switching networks; and threshold logic. One session per week, 3 credits. Prerequisite: 17.224.

17.372 Logic Design II

An extension of the principles of Logic Design I to sequential circuits. Topics include; synchronous sequential circuits, state diagrams and tables, transition tables, state assignment, storage elements, excitation tables, partitioning, merger graphs and tables, implication graphs, asynchronous sequential circuits (fundamental and pulse mode), flow tables, races and cycles, race free assignment, and iterative networks. One session per week, 3 credits. Prerequisite: 17.371.

17.376 Electromagnetic Theory I

Review of vector analysis electrostatic theory and applications including electric field, potential, Gauss's Law, divergence, stored energy, boundary conditions, forces, dielectric materials, conductivity, electrostatic mapping, capacitance, Poisson's and Laplace's equations. Magneto-static theory, including the magnetic field, Lorentz force, motion of charged particles in combined electric and magnetic fields, Amperes Law, inductance, stored energy, boundary conditions, magnetic materials, magnetics and superconductors. Applications include two-wire transmission line, electrostatic shielding, electrostatic photography, precipitators, corona, electron emission, bubble memory devices, MHD power generation, Hall effect, magnetic shielding, and magnetic circuit design. One session per week, 3 credits. Prerequisite: 92.234.

17.381 Engineering Problem Solutions I

A culmination and sophistication of the problem solving techniques used throughout the Electronic Engineering Technology Program. Pascal programming and the digital computer will be used extensively in the solution of these problems. One session per week, 3 credits. Prerequisites: 17.225, 92.234, 92.263.

17.382 Engineering Problem Solutions II

An extension and elaboration of the problem solving techniques presented in 17.381. One session per week, 3 credits. Prerequisites: 17.372, 17.381.

17.391 Project Laboratory B

Students are required to submit project proposal compatible with the advanced technical electives offered. Teams are then assigned to implement selected projects. Use of the computer as a tool to solve experimental problems is encouraged. Written laboratory reports are required. One session per week, 2 credits. Prerequisites: 17.361, 17.366.

17.392 Project Laboratory C

A continuation of laboratory projects of the type offered in Project Laboratory B (17.391). Written reports are required. One session per week, 2 credits. Prerequisite: 17.391.

17.415 Pulse Techniques I

Linear wave shaping, pulse transformers, steady state switching characteristics of devices; clamping and switching circuits; and logic circuits. One session per week, 3 credits. Prerequisites: 17.353 or 17.364.

17.416 Pulse Techniques II

Bistable, monostable, and astable multivibrators; negative resistance devices; negative-resistance switching circuits; blocking oscillator circuits; time base generators; and transient switching characteristics of diodes and transistors. One session per week, 3 credits. Prerequisite: 17.415.

17.417 Minicomputer Programming I

An introduction to fundamentals of absolute and symbolic programming. Typical digital computer organization and operation from a register-reference point of view. Computer word formats, instructions, and symbolic coding. Address modification, index register and looping. Use of system programs including the Debug, Editor, and Assembler. Sub-routines, calling sequences, multiple entry, and return. Program assignments will be run on one of the University's minicomputers. One session per week, 3 credits. Prerequisite: 17.382.

17.418 Minicomputer Programming II

A continuation of 17.417, Minicomputer Programming I. One session per week, 3 credits. Prerequisite: 17.417.

17.441 Energy Conversion

The fundamentals of the five major methods of direct energy conversion, that is, thermoelectricity, photovoltaics, thermionics, magnetohydrodynamics and fuel cells will be studied. The study will include various energy storage methods and conversion techniques. One session per week, 3 credits. Prerequisites: 17.240, 17.362.

17.459 Power Converter Design

The design of modern switching and linear power supplies, basic voltage regulators and power converters, square-wave power converters and regulators, Compound regulating systems, thermal considerations, series-pass regulators, DC/DC converter design, switching regulators and convertors. One session per week, 3 credits. Prerequisites: 17.350, and 17.362 or 17.352.

17.469 Control Systems II

A continuation of 17.350. Control loop design; real frequency and transient response; Nyquist stability criterion; compensation, optimum design; nonlinear systems; and a.c. carrier servomechanisms. One session per week, 3 credits. Prerequisite: 17.350.

17.473 Logic Design III

A continuation of 17.372, Logic Design II. Structure of sequential machines; sets, relations and lattices; state assignment using partitions; serial and parallel decomposition; decomposition with specified components; state identification and fault detection experiments; linear sequential machines; and applications of digital logic. One session per week, 3 credits. Prerequisite: 17.372.

17.477 Electromagnetic Theory II

Review of Maxwell's equations. The wave equation for free space propagation. Concept of a time varying electromagnetic field. Sinusoidal plane waves. Planewaves in dielectric and conductive media. Poynting's vector, depth and penetration, force and radiation pressure, reflection of EM waves from perfect conductors, dielectrics, and multiple dielectrics. Quarter wave and half-wave matching, polarization, Brewster's angle, and surface waves. Introductory concepts in guided electromagnetic waves including transmission lines, waveguides, and antennas from the viewpoint of Maxwell's equations. One session per week, 3 credits. Prerequisite: 17.376.

17.478 Applied Electromagnetics

The conventional two-conductor transmission line theory is presented with emphasis on those results which can be applied to the analysis and design of waveguide transmission. A discussion of the most frequently used microwave oscillators, the magnetron and klystron, are presented. The traveling wave tube concept is emphasized. The interaction of microwave radiation with magnetic materials and practical devices of importance will be studied. Special problems encountered when microwave techniques and methods are extended to the millimeter-wavelength limit of the microwave domain, will be reviewed. One session per week, 3 credits. Prerequisite: 17.477.

17.481 Microprocessors I

An introduction to the architecture and instruction sets of 6800 or 8080 microprocessors. The use of internal registers, control signals and bus structures will be examined. The instruction sets will be investigated through a series of well structured programming examples which stress modular design, program initialization, parallel and interrupt driven I/O operations, and the various addressing techniques. Students will be required to develop programs that exhibit their knowledge of both the

instruction sets and good programming practices. One session per week, 3 credits. Prerequisite: 17.417.

17.482 Microprocessors II

A continuation of 17.481, Microprocessors I. The immediate support chips for the 6800 and 8080 microprocessors will be examined. Hardware interfacing techniques and requirements will be investigated to include the use of RAM and PROM serial and parallel I/O ports, interrupt controllers, memory address decoding, direct memory access controllers, and interrupt timers. The student will be required to develop programs that support these interface applications. One session per week, 3 credits. Prerequisite: 17.481.

17.485 Communication Theory I

Introduction to information, transmission, and communication systems. Review of Fourier series, and Fourier Integrals, discussion of amplitude and frequency modulation systems. An introduction to noise in electrical systems. One session per week, 3 credits. Prerequisite: 17.376.

17.486 Communication Theory II

A continuation of Communication Theory I. Pulse amplitude modulation (PAM), pulse code modulation (PCM), and pulse position modulation (PPM) systems, will be discussed and analyzed. Propagation in free space, antenna theory and propagation characteristics of the ionosphere will be presented. One session per week, 3 credits. Prerequisites: 17.485, 92.234.

17.487 Filter Design I

A review of network analysis. An introduction to synthesis, driving point impedance, approximation theory, and transfer function realization. One session per week, 3 credits. Prerequisites: 17.350, 92.234.

17.488 Filter Design II

An introduction to the analysis and synthesis of active filters. Negative resistance, controlled sources, negative impedance converters and gyrators will be discussed. Course emphasis will be on the operational amplifier as a network element. One session per week, 3 credits. Prerequisite: 17.487.

17.491 Introductory Microprocessor Laboratory

A laboratory based on the 6800 microprocessor. May be used as a technical elective (not EET elective). One session per week, 1 credit. Prerequisite: 17.371.

17.493 Project Laboratory D

A continuation of 17.392, Project Laboratory C,

available as an EET technical elective, for students that desire laboratory experience in addition to the minimum required in the program. Software, as well as hardware projects are permissible. One session per week, 2 credits. Prerequisite: 17.392.

17.494 Telecommunications Engineering

Telephone channels systems objectives for human and machine interface. The switched telephone network hierarchy. Local channel performance, noise, echo, design loss and crosstalk. Frequency division multiplex systems. Time division, network design, topological considerations. Service availability, line usage and blocking. Facsimile, telex. Regulation of common carriers, tariffs. User applications include PABX system analysis. One session per week, 3 credits. Prerequisites: 17.225, 17.371.

Mechanical Engineering Technology

23.111 Engineering Drawing I

Class and laboratory. An introduction to graphical communication. Lectures and exercises on the presentation of data and shape description of mechanical solids. Topics include orthographic projection; isometric and oblique pictorials; sketching. One session per week, 2 credits.

23.112 Engineering Drawing II

Class and laboratory. Descriptive geometry of lines, points, and planes. Intersections; developments; dimensioning. One session per week, 2 credits. Prerequisite: 23.111.

23.113 Machine Drawing

Class and laboratory. Drawing of a machine from layout through details to final assembly, including drawing of cams, gears, fasteners, welding, and piping. Positional and geometric tolerancing. One session per week, 2 credits. Prerequisite: 23.112.

23.201 Machine Tool Laboratory

Modern methods of manufacturing, production, inspection, and measurements of metals and metal fabrications. One session per week, 1 credit.

23.202 Thermo/Fluids Laboratory

Fundamentals of engineering measurements, flow measurement of steam and air, tests of steam turbines and internal-combustion engines, experimental work with refrigeration units, measurements of heat transfer, combustion, fluid flow, and performance of pumps. One session per week, 2 credits. Prerequisites: 23.243, (may be taken concurrently); 23.242.

23.221 Statics

The fundamentals of statics, including such topics as force systems, resultants, equilibrium, friction, first moments of masses and areas. One session per week, 3 credits. Prerequisites: 90.131, 99.141.

23.222 Dynamics

Laws of kinematics of particles and rigid bodies involving absolute and relative motion. Newton's laws as applied to the kinetics of rigid bodies in motion. Principles of work and energy; impulse and momentum. One session per week, 3 credits. Prerequisites: 90.132, 23.221.

23.223 Mechanics of Materials I

Principles of strength of materials, centric, torsional, and flexural loading, principal stresses, Mohr's stress circle, strain, temperature effects, shear and moment diagrams. One session per week, 3 credits. Prerequisites: 90.132, 23.221.

22.320 Machine Design I

Class and laboratory. Application of theories of failure and mechanics of materials to the analysis and design of typical machine elements such as shafts, springs, screws, belts, pulleys, keys, and gears. Problems assigned also illustrate synthesis of ideas applied to design. One session per week, 3 credits. Prerequisites: 23.223, 23.222 (may be taken concurrently.)

23.241 Elements of Thermodynamics I

The thermodynamic system; heat, work; the first and second laws. Properties of vapors and gases. Perfect gas laws. The use of tables and charts. One session per week, 3 credits. Prerequisites: 90.132, 99.142.

23.242 Applied Fluid Mechanics

Properties of fluids, statics of fluids, fluid flow kinematics, momentum, energy conversion, viscosity, flow of real fluids in pipes, ducts and channels, compressible flow. Fluid couplings and torque converters. Flow measurement and fluid machinery. One session per week, 3 credits. Prerequisite: 23.222.

23.243 Elements of Thermodynamics II

The application of thermodynamic principles. Vapor and gas cycles, refrigeration, energy conversion, machinery, mixtures, availability and irreversibility. One session per week, 3 credits. Prerequisite: 23.241.

22.302 Mechanics/Materials Laboratory

Experimental study of heat treating of metals, metallography, fatigue and creep. Limitations of the formulas derived in Strength of Materials are investigated through laboratory projects. One session per week, 2 credits. Prerequisites: 23.223, 22.295, 23.222.

22.295 Materials Science

The mechanical, electrical, thermal, chemical, and magnetic properties of engineering materials and how these properties depend on crystal structure and atomic arrangement. Methods of altering the structures of materials to obtain desired properties. One session per week, 3 credits. Prerequisite: 99.141.

23.353 Instrumentation Systems

Class and laboratory. General concepts of control-system design. Open and closed loop control sys-

tems. Laplace transforms. Transfer functions. Linear control system representation, analysis and synthesis. Performance criteria. Stability, linear feedback system design. Instruments and control devices - general characteristics, selection, and setting. One session per week, 3 credits. Prerequisite: 90.132.

23.354 Problems in Mechanical Engineering Technology

Class and laboratory. A review and extension of applied mechanics. Assigned problem in statics, dynamics, strength of materials and machine design. Introduction to digital computer programming. One session per week, 3 credits. Prerequisites: 23.222, 23.223.

23.355 Robotics

Description of current and proposed Robotic systems and their applications. Structured approach to understanding the functions and interactions of robotic subsystems. Exercises in programming commercially available robots for classroom demonstrations. Methods for determining the capabilities and limitations of robotic subsystem designs through analysis and experimentation. One session per week, 3 credits. Prerequisite: 22.320.

23.405 Senior Project

The application of the student's engineering training to a practical engineering problem. Engineering experience is gained through planning, executing, and reporting on a project approved by staff-advisor. Work may be individual or team effort, depending upon degree of complexity of project. Credit for this subject may be granted for equivalent industrial experience. Contact area coordinator for approval. One session per week, 3 credits. Prerequisite: 20.305.

23.455 Thermodynamics and Heat Transfer

An investigation of the basic laws of thermodynamics with primary emphasis on heat transfer by conduction, radiation, and convection. Also con-

sidered will be the heat transfer problems associated with microelectronics and other high density electronic packaging operations. One session per week, 3 credits. Prerequisites: 90.132, 99.142.

23.471 Design of Automatic Machinery

Basic systems approach to the design of automated machinery emphasizing selection and integration of standard components and controls. Fundamentals of pneumatic, relay and microprocessor controls applied to pneumatic, electro-mechanical and mechanical sensing and actuating components. Basics of parts handling, positioning, assembly, automatic inspection and test in small machinery systems. One session per week, 3 credits. Prerequisites: 17.128, 22.320.

22.473 Mechanics of Materials II

Various topics include shear center, unsymmetrical bending, energy methods, unit dummy load method, failure theories. One session per week, 3 credits. Prerequisites: 90.232, 23.223.

23.472 Applied Dynamics

Statics and dynamics as applied to general systems with oscillatory motion. The kinematics of periodic motion and the vibrations of systems with single degree of freedom. One session per week, 3 credits. Prerequisites: 90.232, 23.222, 23.223.

22.422 Machine Design II

Class and laboratory. Advanced problems in design of machine elements. One session per week, 3 credits. Prerequisite: 23.232.

23.475 Heat Transfer

Class and laboratory. Theory and application of heat conduction in solids. Fluid flow and convection heat transfer; heat exchangers. Radiation of heat and application to problems arising in practice. One session per week, 3 credits. Prerequisites: 90.232, 23.243, 23.242.

22.472 Experimental Stress Analysis

Class and laboratory. The determination of stresses in complex structures by experimental techniques. Photoelasticity, birefringent coatings, brittle lacquer method, analogies, and mechanical and electrical resistance strain gauges. One session per week, 3 credits. Prerequisites: 90.232, 23.223.

22.483 Aerodynamics

Fundamentals of subsonic aerodynamics. Atmosphere models. Airfoil data including Mach number and Reynolds number effects. Circulation, downwash, and three dimensional wing theory. Life and drag of aircraft components. Power curves, and an introduction to aircraft performance calculations. One session per week, 3 credits. Prerequisite: 23.242.

Industrial Technology

20.105 Introduction to Engineering Design

A course to introduce students to industrial practice in design graphics. Topics include graphs, orthographic projection, sectioning, limit dimensioning, gear trains, cams and fasteners. A mechanical design problem completes the semester's work. One session per week, 3 credits.

20.107 Engineering Design Laboratory

A laboratory course to provide the practical experience and application of the theory and techniques of 20.105 to actual industrial design case studies. One session per week, 1 credit. Corequisite: 20.105.

20.151 Hydraulics for Plant Operators

Topics include fluid properties, pressure, flow through pipes, fittings and channels, flow measuring instruments, pumping. One session per week, 3 credits.

20.152 Water Biology

An introduction to the biology of natural waters. Topics include freshwater animals, plants, community relationships, population dynamics, effect of pollution, water borne disease. Includes some lab and field work. One session per week, 3 credits.

20.201 Introduction to Materials

A practical study of the structure of metals, their properties and applications. This course includes selection, alloy phase diagrams and heat treatment as well as application for use in extreme environmental conditions. One session per week, 3 credits.

20.203 Industrial Power Transmission

An introduction to the design or selection of mechanical elements used in the transmission of power in industrial equipment. Elements considered include shafts, pulleys, gears, and gear trains, bearings, clutches, brakes and springs. One session per week, 3 credits. Prerequisite: 23.221 or equivalent.

20.208 Advanced Materials

This course is a continuation of the study of materials. It covers metal processing, ceramics, concrete, composite materials, as well as, joining methods for materials, including mechanical fastening, adhesives, soldering, brazing and welding. One session per week, 3 credits. Prerequisite: 20.201.

20.211 Industrial Technology Laboratory

Laboratory studies designed to accompany Introduction to Materials and Advanced Materials. One session per week, 1 credit. Prerequisites or core-

quisites: 20.201, 20.208.

20.225 Water Chemistry I

This course covers basic chemical theory. Reactions and equations will be presented along with an introduction to the structure and character of water, its impurities and the chemical treatment schemes that have been devised to deal with them. One session per week, 3 credits.

20.226 Water Chemistry II

A continuation of 20.225, it covers specific water and wastewater treatment practices such as chlorination, coagulation, filtration, and absorption, with a focus on analytical techniques for the particular parameters of interest. Wet chemistry as well as instrument methods will be discussed and demonstrated during lab sessions that compliment the lecture material. One session per week, 3 credits. Prerequisite: 20.225.

20.251 Wastewater Treatment Plant Operations I

This course is geared to the assumption that students are not familiar with plant operations. Lectures begin on preliminary treatment and proceed through primary and various types of secondary treatment with emphasis on activated sludge, chlorination, and sludge dewatering and ultimate disposal. The primary emphasis is on the conventional activated sludge process. One session per week, 3 credits.

20.252 Wastewater Treatment Plant Operations II

This course is available for those who have taken 20.251, or for plant operators experienced in biological treatment. Control of the activated sludge process is emphasized, based upon solids balancing, using the centrifuge and settleometer. This technique has been developed by AI West of EPA. In addition, industrial wastes and advanced wastewater treatment are covered, including the removal of phosphates and nitrates. One session per week, 3 credits. Prerequisite: 20.251.

20.253 Wastewater Treatment Lab I

An introductory course teaching the basic laboratory techniques and procedures used to operate and monitor conventional wastewater treatment facilities. Included are solids, chlorine residual, pH, BOD, total coliform, alkalinity, acidity, sludge, and microscope analysis. One session per week, 1 credit. Corequisite: 20.251.

20.254 Wastewater Treatment Lab II

An advanced course designed to teach the lab techniques and procedures used to operate and monitor advanced wastewater treatment facilities. Included are "West" method, nitrification, phosphorous, jar test, COD, BOD, TOC, total coliform, turbidity, and chloride analysis. One session per week, 1 credit. Prerequisites: 20.251, 20.253.

20.255 Water Distribution Systems

This course is an introduction to the principles, materials and practices in the operation and maintenance of drinking water distribution systems, including the following topics: system hydraulics, pumping, mains, services, valves, hydrants, metering, flushing, storage, fire control, leak control, cross connection prevention, disinfection, etc. One session per week, 3 credits.

20.257 Water/Wastewater Plant Management I

An introduction to the principles of management with emphasis on topics related to the operation of water and wastewater treatment plants. The following subjects will be discussed: staffing, labor relations, public relations, financing, budgeting, legislation, and management principles. One session per week, 3 credits.

20.258 Water/Wastewater Plant Management II

A continuation of 20.257, Water/Wastewater Plant Management I, with an emphasis on supervisory

management for water and wastewater personnel. Rate studies, user services, labor relations, and numerous case studies will be utilized. One session per week, 3 credits. Prerequisite: 20.257.

20.305 Manufacturing Processes

Course work entails introduction to nonconventional machining such as Electrical Discharge Machining, and the various forms of chemical machining; automatic manufacturing concepts from electromechanical operations to the fundamentals of numerical control manufacturing; forming, casting, fastening and assembly techniques are also covered. The objective is to develop a broader understanding of manufacturing operations and product design/manufacturing relationships. Laboratory experience includes nonconventional machining, numerical control operations and programming. One session per week, 3 credits. Prerequisites: 20.105, 20.107, 23.201.

20.307 Fluid Power Controls

Laboratory experiences and lectures on the elements of hydraulic and pneumatic power systems, and the automatic control of these systems. Systems elements studied are actuators, valves, power sources and accessories. Control systems studied are pneumatic, electronic and fluidic logic. Electrical solenoid and relay control circuits are designed. One session per week, 3 credits.

20.310 Industrial Safety

A practical study of industrial safety and accident prevention. Studies include hazard analysis, safety management, engineering remedies and risk management. Numerous practical cases are presented and the roles of governmental agencies in safety are analyzed. One session per week, 3 credits.

20.314 Motion and Time Study

Methods improvement and work measurement techniques, including principles of motion economy, work simplification, process and operator charts,

work sampling and time standards. One session per week, 3 credits.

20.351 Water Supply and Treatment Operations I - Basic

An introduction to the principles and practices of operation and maintenance of drinking water supplies and treatment plants. The following topics will be covered using case studies: sources of supply, well and reservoir operation, contaminants and regulation, hazardous materials, overview of treatment, chemical feeding, coagulation, settling, operating conditions, filtrations, solids handling, disinfection, chlorination, flouridation. One session per week, 3 credits.

20.352 Water Supply and Treatment Operations II - Advanced

A continuation of 20.351, Water Supply and Treatment Operations I, covering the following topics: corrosion control, oxidation and aeration, use of ozone, chlorine dioxide and potassium permanganate, iron and manganese carbon, softening, instrumentation and control, system contamination control, reverse osmosis, ultrafiltration, electrodialysis, distillation and UV, energy management. One session per week, 3 credits. Prerequisite: 20.351.

20.353 Water Works Operations Lab I

This laboratory course will introduce the student to fundamental laboratory equipment as it applies to the operation of water treatment facilities. The following determinations will be conducted: odor, test, color, turbidity, jar tests, pH, chlorine residual, acidity, alkalinity, hardness, chlorides, iron, manganese, phosphate, aluminum, nitrogen cycle, coliform, microscopic analysis, heavy metals and organics. One session per week. 1 credit.

20.354 Industrial Waste Treatment

An introductory approach to the operation and control of the major types of industrial waste treatment processes. The industrial waste treat-

ments to be discussed include the following industries: textile, food processing, paper, metal finishing, and tanneries. This course will include basic lab work to include pH, alkalinity, acidity, chlorine residual, and solids. One session per week, 3 credits.

20.355 Water Works Operations Lab II

This course presents a continuation from the material in 20.353. The following determinations will be conducted: fluoride, fecal coliform, phosphate, algae and microscopic analyses, filterability, TKN, TOC, heavy metals with AA apparatus, activated carbon assessment, and laboratory quality assurance. One session per week, 3 credits. Prerequisite: 20.353.

20.402 Manufacturing Operations

This course is organized so that students can design the manufacturing process and fabricate a product for small quantity production. Accompanying lectures cover pertinent subject areas such as: forecasting, plant layout, materials handling, pert/cost, product evaluation and equipment selection. One session per week, 3 credits. Prerequisite: 17.127.

20.407 Instrumentation & Process Control

An introduction to process control system technology. Liquid level, rate of flow, pressure and temperature measuring devices and their characteristics. R-C of system components. Integral, dead-time and first order lag processes. Control modes. Bode diagrams and frequency response. One session per week, 3 credits. Prerequisite: 17.127.

20.409 Instrumentation & Process Control Laboratory

A laboratory course to supplement the theory studied in 20.407. Various mechanisms used in industrial processes and their controls will be assembled and varied to accomplish the task required by practical problems. Equipment will also be built to automated control of processes. One

session per week, 1 credit. Corequisite: 20.407.

20.414 Industrial Economic Management

Analysis of available alternatives in equipment, plant and materials purchasing or leasing. Economic feasibility analysis of industrial projects including depreciation techniques, break-even analysis, benefit-cost techniques, replacement, present worth and rate of return analysis. One session per week, 3 credits.

20.416 Statistical Quality Control

A study of the statistical and administrative techniques relative to the maintenance of product quality at defined levels. Sampling plans for variables and attributes are considered from the viewpoint of consumer-vendor relationships and economics. One session per week, 3 credits. Prerequisite: 92.383.

20.423 Product Liability

Product liability has become of increasing importance to industrial engineers due to legal decisions involving direct placement of liability for safe products on original manufacturers, and on individual responsible engineers. In this course, the legal aspects of negligence, strict and implied liability will be developed and the role of engineers in designing, manufacturing and testing reasonable, safe products will be defined. The role of government agencies such as the Consumer Product Safety Commission and reference sources for product liability literature will be examined. Numerous product liability cases will be reviewed with specific examples of investigative techniques utilized to prove liability for failure. One session per week, 3 credits.

20.427 Plant Lay-Out and Materials Handling

A study of materials flow, layout production, assembly and service departments, manufacturing, buildings, service facilities, handling equipment, and packaging techniques. One session per week, 3 credits. Prerequisites: 20.105, 20.107.

20.429 Occupational Safety and Health Regulations, and Regulatory Agencies

An introduction to the general concepts of safety and health. Topics include historical developments, program concepts, social, legislative and regulatory requirements and basics of hazard recognition, evaluation and control. The role of governmental agencies, such as OSHA, EPA, and NIOSH, in safety will be explored. In addition to course credits, a certificate will be issued from OSHA upon completion. One session per week, 3 credits.

20.430 Industrial Hygiene and Toxicology

An introduction to the principles of industrial hygiene and toxicology. Topics include elements of toxicology and occupational disease, airborne contaminants, ionizing and non-ionizing radiation, noise and vibration, and heat stress. Emphasis on understanding biological response to and measurement of environmental hazards. Application of non-engineering controls with some introduction to the concepts of engineering controls. One session per week, 3 credits. Prerequisite: 20.429.

20.431 Safety Management

Application of management principles to loss control programs. Topics include organization of the safety function, program evaluation techniques, budgeting for the safety function, evaluation of training and education programs, emergency planning, relationships with line and staff functions, the legal environment of safety and health, and loss control accountability. One session per week, 3 credits. Prerequisites: 66.371, 20.429.

20.432 Fire Prevention and Protection

Introduction to fire prevention and protection. Study of the behavior of fire, fire hazards of materials, fire safety in facilities and equipment of design, design of fire protection systems and detection systems, process fire hazards, transportation fire hazards, and fire codes. One session per week, 3 credits. Prerequisites: 20.310, 20.429.

20.433 Human Factors in Engineering Design

An examination of the variables that influence the human operator in man-machine-environment systems. Topics include the nature of man-machine systems, the capabilities and limitations of humans and machines, simulation for design and training, principles of symbolic and pictorial displays, static and dynamic forces on the human frame, response to environmental stress, and vigilance and fatigue. One session per week, 3 credits. Prerequisites: 47.101, 23.221, 92.383.

20.452 Operation and Maintenance of Wastewater Collection Systems I

This course will examine the proper operation and maintenance of wastewater collection systems. Inspection, testing, installation, and repairs of the collection system will be covered. Health hazards encountered in this work will be addressed and safety will be emphasized. Pumping station operation and maintenance will be covered in detail. Confined space entry and working in hazardous environments is covered. One session per week, 3 credits.

20.453 Operation and Maintenance of Wastewater Collection Systems II

Locating and evaluating problems such as sewer blocks, leaks, odors, breaks and lift station failures. The selection of procedures and equipment to minimize the reoccurrence of these problems will be addressed. Cost effectiveness of purchasing versus leasing construction equipment for major work will be discussed. Organization, administration and union involvement in the field will be covered. State-of-the-art construction and design will be covered with a field trip to a modern pumping facility.

20.455 Solid Waste Management

An introduction to the principles and practices of solid waste management with emphasis on the sources and characteristics of present day solid wastes; current collection methods, systems and

equipment; available disposal techniques and facilities; public health, economic and environmental issues; future trends in the solid waste industry. One session per week, 3 credits.

20.457 Advanced Water and Wastewater Laboratory

Includes some of the most modern instrumental techniques for water and wastewater analysis including A.A., TOC, and gas chromatography. Also includes laboratory quality control with special emphasis on laboratory certification. One session per week, 3 credits. Prerequisites: 20.253, 20.254.

20.458 Biological Treatment Process Control and Troubleshooting

Emphasis on optimizing the operation of wastewater treatment plants. Includes the latest operational techniques and the use of process controls modifications. Also includes laboratory work, special projects, group discussions and field visitation. One session per week, 3 credits. Prerequisites: 20.251, 20.252, 20.253, 20.254.

Plastics

27.201 Plastics Materials Science I

Class and laboratory. The history, classification, definitions, raw materials, methods of manufacture, properties and uses of polymeric materials with emphasis on the engineering plastics. Laboratory sessions and demonstrations as scheduled by the instructor. One session per week, 3 credits.

27.202 Plastics Materials Science II

Class and laboratory. A continuation of 27.201 with special emphasis on fillers and reinforcements, modifiers, additives and other ingredients that go into making typical plastics molding compounds. Introduction to laminates and reinforced plastics, film and sheeting, as well as adhesives, and miscellaneous resins are surveyed. Laboratory sessions and demonstrations as scheduled by the instructor. One session per week, 3 credits. Prerequisite: 27.201.

27.301 Additives for Polymeric Materials

Analysis of additives including stabilizers, plasticizers, fillers and reinforcements, biocides, flame

retardants, antistatics agents, and release agents. Special emphasis on the characteristics of each type of additive, compatibility interactions, and effects on processing. Review of the most current methods of testing efficiency of each additive system. One session per week, 3 credits.

27.303 Reinforced Plastics Composites

Review of composites as a class of materials and the mechanical physical characteristics. Fundamental concepts underlying these properties with particular emphasis on fibrous reinforced plastics. Survey of matrices, reinforcements, and methods of fabrication. One session per week, 3 credits. Prerequisite: 27.202.

27.373 Plastics Mold Engineering I

Class and laboratory. Introduction to the principles of basic mold and die design and construction. Laboratory design of molds and/or dies to be constructed in continuing portions of this course. Lecture, laboratory and demonstrations at the discretion of the instructor. One session per week, 3 credits. Prerequisite: 27.401.

27.376 Mold Engineering II

(Continuing of 27.373, which is a prerequisite.)
One session per week, 3 credits.

27.401 Processing Technology I

Class and laboratory. Theory and methods of processing plastics materials including compounding, molding, extruding and thermoforming. Evaluation and development of typical problems. Laboratory sessions and demonstrations as scheduled by the instructor. One session per week, 3 credits. Prerequisite: 27.202.

27.402 Processing Technology II

Class and laboratory. A continuation of 27.401, which touches extensively upon casting, laminating, fabricating, and finishing. Correlation of composition, processing and fabricating with product design and applications is also covered. Laboratory sessions and demonstrations as scheduled by the instructor. One session per week, 3 credits. Prerequisite: 27.401.

27.403 Physical Properties of Polymers I

Introduction to basic mechanical properties of polymers as linear viscoelastic materials. Concepts of creep, stress relaxation, and superposition principles emphasized. Dynamic mechanical behavior, interrelations between various properties, electrical behavior, miscellaneous mechanical properties, optical properties. Prerequisite: senior status.

27.404 Physical Properties of Polymers II

A continuation of 27.403.

27.405 Polymer Characterization

Instrumental methods of characterizing plastics materials. The theory and interpretation of infrared spectroscopy, gas chromatography, gel permeation chromatography, differential thermal analysis, thermal gravimetric analysis, osometry, etc. The deter-

minations will include elucidation of structure, identification, molecular weight, molecular weight distribution and glass transition temperatures. One session per week, 3 credits. Prerequisite: 84.122, permission of coordinator.

27.406 Polymer Structure

The fundamental relationship between molecular structure, properties and end-use applications of plastics materials will be explored in detail. Molecular structural features include chemical composition, molecular size and flexibility, intermolecular order and binding, and supermolecular structure. Properties include processability, mechanical, acoustic, thermal, electrical, optical and chemical properties, price, and balance of properties. Applications include rigid solids, flexible solids, foams, film, and non-plastic applications. Prerequisite: permission of coordinator.

27.407 Plastics Industry Organization

Economics of producing plastics raw materials and converting them into end products, from research and development to plant construction, operation and marketing. Market analysis of plastics production, processing, and consumer patterns; commercial development, sales, and technical service. Organization of the plastics industry for research and development, specialty and commodity production, profit and growth. Prerequisite: permission of coordinator.

27.451 Selected Topics in Polymers I

Specialized topics in applied polymer science, adhesives, elastomers, coatings, and fibers as well as other timely subjects. One session per week, 3 credits. Prerequisite: permission of coordinator.

27.452 Selected Topics in Polymers II

(Continuation of 27.451, which is a prerequisite, also permission of coordinator.) One session per week, 3 credits.

Clinical Laboratory Sciences

35.201 Human Anatomy & Physiology I

Human Anatomy & Physiology is a two-semester sequence which covers the basic structure and function of the human body. First semester topics include the Basic Body Plan; Cell Anatomy; Cell Physiology; The Integumentary System; The Skeletal System; The Muscular System; The Nervous System; Endocrinology and The Special Sensory System. One session per week, 3 credits. Prerequisite: 1 semester of chemistry. Corequisite: 35.203.

35.202 Human Anatomy & Physiology II

Human Anatomy & Physiology II is a continuation of the study of the human organism relating structure and function. Among the systems covered will be The Circulatory, Respiratory, Digestive, Excretory, and Reproductive Systems of man. One session per week, 3 credits. Prerequisite: 35.201. Corequisite: 35.204.

35.203 Human Anatomy & Physiology Lab I

The laboratories are designed to reinforce material covered in lecture by practical exposure to the subject matter. Another outcome will be the understanding of the practical application of basic laboratory techniques and methodology. One session per week, 1 credit. Corequisite: 35.201.

35.204 Human Anatomy & Physiology Lab II

Each laboratory session is designed to reinforce the didactic material with practical exposure to the structural and functional aspects of the human body. One session per week, 1 credit. Corequisite: 35.202.

35.211 Basic Clinical Microbiology and Pathology

This course is designed to study the fundamentals of microbiology with major emphasis on the structure and function, growth and metabolism and classification of clinically important microorganisms; the origin and mechanism by which microorganisms produce disease; the human body's response to invading microbes; an introduction to the ecological aspects of microorganisms in the environment with particular stress on their significance, activities (beneficial and detrimental) and control measures. One session per week, 3 credits. Prerequisites: 35.103, 35.104. Corequisite: 35.213.

35.213 Basic Clinical Microbiology and Pathology Laboratory

Laboratory investigations of basic properties and characteristics of microorganisms; the student will perform commonly used techniques for collecting, handling and studying clinically important microorganisms. One session per week, 3 hours, 1 credit. Prerequisites: 35.103, 35.104. Corequisite: 35.211.

Nursing

30.201 Community Health

This course emphasizes the concepts, philosophy and principles of public health and the relationship to the physical, mental and social well-being of the community, its individuals, families and groups. The focus is on the prevention of disease, the promotion and maintenance of health and provision of environmental and personal health services through organized community effort.

33.201 Concepts of Professional Nursing Practice

This course introduces the student to concepts utilized in the practice of nursing. Consideration is given to the process of adaptation with primary focus on students adapting to the nursing role. Utilization of the nursing process is viewed as the scientific method of nursing and nurse patient interaction. Health assessment skills are taught and practiced in laboratory setting. Basic nursing perceptual-motor skills are learned in a self-paced autotutorial laboratory setting. Clinical practice sessions are incorporated in the latter part of the course. Prerequisite: First 3 semesters of nursing curriculum. Corequisite: 33.202, 6 credits.

33.202 Pathophysiology

This course is designed to present a conceptual approach to human pathophysiology. Content focuses on the basic mechanisms of disease processes and the resulting alterations in body function. Selected major health problems are studied as representative concepts of sensory deprivation, auto-immune response, fluid and electrolyte imbalance, oxygen deprivation, abnormal cell proliferation, chemical deregulation, interference with nutrition with neural dysfunction. Corequisite: 33.201.

33.401 Nursing Care of Clients in Crisis

Building upon previous knowledge of developmental and situational stresses, crisis is viewed from a

theoretical perspective. The dynamics of crisis situations as they involve individuals, families and the community are analyzed. Clinical practice is planned to give students the opportunity to relate their experiences to appropriate theoretical models and to carry out therapeutic interventions appropriate to the care of clients at risk, to or experiencing crisis. Prerequisite: 33.305.

33.402 Issues and Trends in Nursing

This course focuses on significant issues and trends resulting from societal developments. The impact of these issues and trends on professional nursing and health care is examined. Prerequisite: 33.401. Corequisite: 33.403.

33.403 Leadership in Nursing Practice

The student's potential for directing, guiding and influencing others is developed in selected group experiences. Knowledge gained from theory, research, and experience is investigated and analyzed critically. The data are applied to the health care management of clients and families through the use of the nursing process, stressing client advocacy and interdisciplinary cooperation. The student will examine his own philosophy, learning needs, and growth, preparatory to becoming a more fully self-directed professional nurse. Prerequisite: 33.401. Corequisite: 33.402.

33.404 Comprehensive Nursing Practice

This clinical course focuses on the transition to the professional nursing role. Planned clinical experiences are provided so that nursing skills can be refined and role behaviors and values internalized. Weekly conferences provide opportunities to share experiences and to evaluate progress in meeting objectives.

Criminal Justice

44.101 The Criminal Justice System

This course includes a brief history of the Criminal Justice System and an analysis of its structure and function. Required for all majors and prerequisite to all courses in Criminal Justice. One session per week, 3 credits.

44.131 Principles of Law and the Criminal Justice System

Basic principles of law and the working of the legal system are discussed as they pertain to the criminal justice professional. There will be particular emphasis on legal reasoning and analysis. One session per week, 3 credits. Prerequisite: 44.101.

44.141 Police Functions: Theory and Applications

An examination of the historical development of police work with special emphasis on the conflicting role expectations facing the police officer. One session per week, 3 credits.

44.151 Introduction to Corrections I

A comprehensive view of theory, practice and philosophy involved in the treatment of convicted law violators of all ages. One session per week, 3 credits.

44.221 Criminology I

The definition and nature of crime, criminal statistics, and a survey of theories of crime causation will be included. Required for all majors. One session per week, 3 credits.

44.234 Criminal Law

The historical origins and developments of criminal law from the early common law to contemporary decisions and statutes. Constitutional and statutory factors as they pertain to crime, defense, and crimes against persons and property will be considered. In addition, attention is directed toward limitations of

criminal responsibility, capacity and the law of arrest. Sections of the Massachusetts Criminal Code and other statutes will be covered where applicable. One session per week, 3 credits. Prerequisite: 44.131.

44.243 Criminalistics I

Basic procedures in arrest, search and seizure, and the gathering as well as the evaluation of evidence as to admissibility, weight, and competence. One session per week, 3 credits. Prerequisite: 2 semesters of science.

44.244 Criminalistics II

Collection, identification, preservation, and transportation of physical evidence. The crime laboratory and its effectiveness, capabilities and limitations in assisting the police officer and utilizing physical evidence as a means of apprehension and/or conviction. One session per week, 3 credits. Prerequisite: 44.243.

44.261 Juvenile Delinquency

Causative factors in the development of youthful offenders will be examined. The development and philosophy behind treatment of juvenile court and clinic, training schools, and contemporary innovative practices will be covered. One session per week, 3 credits.

44.231 Criminology II

An examination of theories of criminal behavior, both historical and contemporary, and their impact on the evolution of punishment, treatment and rehabilitative practices. One session per week, 3 credits. Prerequisite: 44.221.

44.331 Penal Law

A study of the constitutional rights of incarcerated individuals, including major policy issues and trends associated with recent revisions of penal codes reflecting court decisions for the preservation of

offenders' rights. One session per week, 3 credits. Prerequisite: 44.234.

44.335 Juvenile Court Philosophy and Practice

Examination of the civil procedures used in the juvenile court as opposed to the adversary procedures used in the criminal court, together with a history of the development of the juvenile court and an examination of its constitutional basis. One session per week, 3 credits. Prerequisite: 44.261.

44.341 Comparative Police Systems

A study of various police systems on the national and international level and a comparison with local systems of the basis of organization, structure, and administration of law enforcement agencies. Agencies in Europe, United Kingdom, Soviet Union and other parts of the United States will be reviewed. One session per week, 3 credits.

44.351 Alternatives to Corrections I

Modern trends in corrections, such as the community based programs in work-release, half-way houses, parole clinics, the therapeutic community, and team treatment concept in institutions are evaluated. One session per week, 3 credits. Prerequisite: 44.151.

44.354 Probation and Parole

The historical development of both probation and parole, and an examination of their place in the criminal justice system. There will be an emphasis on recent trends including diversion, flat sentencing, week-end sentencing, and the problems resulting from departure from traditional practices. One session per week, 3 credits.

44.360 Minorities and the Criminal Justice System

Both social and legal consequences of racism and discrimination will be discussed as they pertain to minorities and the criminal justice system. Because

of the necessary reliance on some legal knowledge and legal reasoning, the following requirements are enforced: 44.234, 46.205 or 46.206. One session per week, 3 credits.

44.371 Criminal Justice Management and Planning

An introduction to the principles of administration, including planning, budgeting, grantmanship and evaluation, as they relate to the criminal justice manager. One session per week, 3 credits.

44.372 Issues in Correctional Administration

Specific analysis of the management of correctional institutions, including custody, classification, reception, programming, release, staffing, scheduling, collective bargaining, and other related issues. One session per week, 3 credits. Prerequisite: 44.371.

44.373 Issues in Police Administration

Specific analysis of the management of contemporary police force, including staffing, scheduling, training, collective bargaining, community relations, and other related issues. One session per week, 3 credits. Prerequisite: 44.371.

44.380 Selected Issues in Law and Justice

Topics chosen from current issues and problems in criminal justice. Subjects taken up in the course will vary, but will include such questions as victimology, social and psychological aspects of crime, crime control and deterrence, evaluation and policy research. One session per week, 3 credits.

44.390 Research Methods in Criminal Justice

An overview of the role of research in the criminal justice system, including terminology, standard methodologies, and elementary statistics. One session per week, 3 credits.

44.401 Seminar On Drugs

The course objective is designed to cover the

problems of drugs, drug abuse, the law and its application. Treatment of and alternatives to drug rehabilitation will be studied in addition to the classification, identification, distribution, and control of drugs. One session per week, 3 credits.

44.490 Criminal Justice Research Seminar

Specific practice in the definition, design and execution of a research project, and an analysis of the impact of contemporary criminal justice research on policy development. One session per week, 3 credits. Prerequisite: 44.390.

44.496 Practicum - Field Experience I

Assigned field work under supervision and with permission of coordinator designed to broaden the educational experience of pre-service students in law enforcement and corrections by providing exposure in selected correctional, law enforcement, probation and parole agencies within the area. This course is designed to provide a correlation of theoretical knowledge with practical experience in an area of particular interest to the students. One session per week, 3 credits.

Area I: Behavioral and Social Sciences

43.105 Western Civilization to 1715

Traces the major forces in the development of European history from the fall of the Roman Empire to 1715. One session per week, 3 credits.

43.106 Western Civilization Since 1715

Examines the major forces in the development of modern European history from the French Revolution to the present. One session per week, 3 credits.

43.111 United States History to 1877

Traces the development of American history and institutions from the colonization to the end of Reconstruction. (not open to history concentrators) One session per week, 3 credits.

43.112 United States History Since 1877

Examines significant developments in American history from the end of the Reconstruction period to the present. (not open to history concentrators) One session per week, 3 credits.

43.205 Pre-Columbian America

A study of the peoples and civilizations of the

Americas from their origins to first contact with Europeans. One session per week, 3 credits.

43.237 American Environmental History and Politics

Attitudes, policies, and behavior of Americans and their government toward the environment. Special attention to current issues evolving out of our past attitudes and policies. One session per week, 3 credits.

43.239 American Economic History

A study of the growth and development of the American economy from its European origins to the present. One session per week, 3 credits.

43.277 Ethnic Groups in American Life

An examination of the importance of ethnic groups in American history. The course will treat several major ethnic groups and assimilation or non-assimilation into American life. Field work and research on ethnic groups in the Merrimack Valley. One session per week, 3 credits.

43.304 Recent U.S. History, 1940 to Present

The involvement of the U.S. in World War II marks

a major turning point in American History. It ushers in twenty years of Cold War tensions, the militarization of society and participation in foreign alliances and limited wars. Anti-communist conservatives, militant Blacks and a New Left polarize politics and produce a contemporary crisis of confidence in American society. One session per week, 3 credits.

43.312 Contemporary Latin America

An analysis of significant trends and problems of Latin America, with emphasis on the cultural, economic, political, and social conditions which stimulate or deter progress. One session per week, 3 credits.

43.313 American Social History to 1880

Selected topics in American social history, including mobility and class structure in American life, American religions, ideals of family life and child rearing, race and ethnic groups in American life, myths and reality in American economic groups. One session per week, 3 credits.

43.314 American Social History Since 1880

A continuation of the preceeding. One session per week, 3 credits. Prerequisite: 43.313.

43.316 History of Lowell

An examination of the history of industry, politics, and the culture of the city of Lowell. Work will be done largely in original sources and a research project is required. One session per week, 3 credits.

43.317 The American Frontier

Readings and discussion of the history of the American society and thought. One session per week, 3 credits.

43.320 Contemporary American Foreign Policy

A study of the process of American foreign policy in the contemporary world. The case study method

will be used to illustrate problems of strategy and tactics in such areas as Europe, Latin America, Africa, and the Near East. One session per week, 3 credits.

43.324 The Rise of American Industrial Society

Selected topics in the economic history of the United States. Topics include: railroads and the development of a national market, the exploitation of national resources, the rise of new industries, the problems of labor, the consolidation of business, and the problems of agriculture in the new industrial state. One session per week, 3 credits.

43.365 The American Indian

A study of native Americans from their first contact with Europeans to the present, with special emphasis on North American Indians and their relationship with the United States government. One session per week, 3 credits.

46.101 Introduction to American Politics

An introductory analysis of the structures, functions, and behavior of the American political community. The analysis will emphasize politics and political behavior at the national level. One session per week, 3 credits.

46.121 Introduction to International Relations

Surveys of some recent methods and approaches used in the study of international politics and the introduction to current problems of foreign policies of major world powers. One session per week, 3 credits.

46.131 Introduction to Law and the Legal System

An introduction to the nature and operation of the American Legal System; consideration of its political and social functions. Examinations of the structure, behavior and process as well as doctrine drawn from several areas of civil, criminal, and constitutional law. Required for criminal justice

majors. One session per week, 3 credits.

46.205 Constitutional Law and Civil Liberties

An introductory examination of selected major contemporary civil liberties issues and the American process of constitutional adjudication through a study of Supreme Court decisions and related readings. Emphasis on study, debate, and discussion of the continuing "first amendment" controversies, establishment and free exercise of religion, free speech, free press, obscenity, academic freedom, etc. Attention also to the expansion of procedural guarantees, primarily in the area of criminal justice. One session per week, 3 credits.

46.206 Constitutional Law and Civil Rights

An introductory examination of selected major current civil rights problems and the American process of constitutional adjudication through a study of Supreme Court decision and related readings. Primary emphasis on study, debate, and discussion of the developing equal protection controversies and the "Affirmative" remedies that have arisen from judicial efforts to command equality in areas such as school desegregation, sex discrimination, affirmative action, and legislative reapportionment. Attention also to other developing areas such as privacy, abortion, etc. One session per week, 3 credits.

46.256 Public Administration

A study of the bureaucratic organization and behavior in the American society. The course covers the Federal Administration in process with a particular emphasis on the problems of bureaucratic authority versus democracy and social change. One session per week, 3 credits.

46.282 Contemporary Political Theory

An examination of major ideological currents in the contemporary world. Marxism, communism, fascism, anarchism, and the relevance of Freud to modern political thought are some of the possible

topics for examination. One session per week, 3 credits.

46.344 The American Presidency

An examination of the nature of the American Presidency and its functioning within the American political system. Specific attention will be given to the problems and the evolution of the Presidency since World War I. One session per week, 3 credits.

47.101 General Psychology

A basic introductory course, primarily for non-concentrators, surveying the major areas of psychology, including the nature of psychology as a science, learning, human development and personality, perception, and motivation, behavioral disorders, and social behavior. One session per week, 3 credits.

47.163 The Human Life Span

Primarily for non-concentrators, this course surveys the major stages and processes in human development from birth to death. One session per week, 3 credits.

47.209 Social Psychology

An introduction to the study of social behavior in interpersonal relationships, groups, organizations, and the community. Topics include attitudes and attitude change, group dynamics, leadership, and inter-personal influences. One session per week, 3 credits.

47.232 Psychology of Personality

A survey of the major theories of personality, beginning with Freud and psycho-analysis, the neo-Freudians, existential psychology, humanistic theories of Rogers and Maslow, and behavioristic and social learning theories. The interplay between theory and research is also considered. One session per week, 3 credits.

47.262 Adolescent Psychology

An examination of developmental issues during adolescence, including personality development and the emergence of identity, peer relations, the development of moral values, and sources of maladjustment. One session per week, 3 credits.

47.272 Abnormal Psychology

An introduction to the study of various patterns of neurotic, psychotic, and character disorders. Therapeutic techniques and other auxiliary methods for the treatment of such disorders are studied in relation to contemporary theory and research. One session per week, 3 credits. Prerequisite: 47.101.

47.328 Dynamics of Interpersonal Relations

An analysis of psychological dynamics in interpersonal behavior, emphasizing such topics as conformity, leadership, interpersonal growth, self-disclosure, personal styles of interaction, and technique of change. The primary focus will be on the behavior of the students themselves who form a small group in which they are expected to participate. The course is taught without a formal prerequisite, but students would have some previous course work in psychology. One session per week, 3 credits.

47.335 Psychology of Women

A consideration of such topics as: the psychology of sex differences; sex roles and socialization; sex stereotypes and attitudes toward women; women's self-concept and achievement; biological basis of psychological sex differences; the nature of female sexuality; clinical theory and practice concerning women; women as mental patients and mental health consumers; implications for psychology and for women's status. One session per week, 3 credits.

47.356 Psychological Tests and Measurement

A survey of several major tests used to assess such factors as mental abilities, vocational interest, at-

titudes, and personality. Students learn to administer, score, and interpret specific tests and the ways in which information is compiled to complete a case study of individuals tested. One session per week, 3 credits.

47.364 Psychology of Crime and Corrections

An investigation of the psychological aspects of crime and deviance, and the nature of punishment and rehabilitation. Clinical case histories or criminal personalities will be combined with experimental studies of anti-social and violent behavior. The nature of prisons and criminal justice will also be examined. One session per week, 3 credits. Prerequisite: 47.272.

47.371 Behavioral Problems of Childhood

This course examines specific aspects of disorder occurring during childhood and early adolescence, including neurotic disorders, autism and psychosis, retardation and learning disabilities, and conduct disorders. Case histories and research dealing with assessment, etiology, and treatment will be presented. One session per week, 3 credits. Prerequisite: 47.261 or 47.272.

47.473 Seminar in Social Psychology

Intensive study of one or more of the following special topics in social psychology including the following: psychology of the family and parent-child relations, moral development, adjustment during adulthood, death and dying, etc. One session per week, 3 credits. Prerequisites: 47.101, 47.209.

47.474 Seminar in Developmental Psychology

Careful consideration of selected topics in the area of human development, including the following: psychology of family and parent-child relations, moral development, adjustment during adulthood, death and dying, etc. Prerequisite: 47.101, 47.163.

48.101 Introduction to Sociology

This is the basic course in sociology. Emphasis is directed at the ways in which social institutions such as government, schools, the economy, social class, and the family develop and influence our lives. It is concerned not only with presenting various ways to understand our relationship to society, but also with ways to change it. One session per week, 3 credits.

48.201 Social Anthropology

Using the comparative approach to the study of society, this course examines several distinct cultures as a means of understanding both the universal constants and the variations in human societies. One session per week, 3 credits.

48.229 Self Assessment & Career Development

A study of the meaning of work in our society. Class participants will assess their own life experiences and develop plans to integrate interests, values, and abilities into meaningful and realistic life/work options. One session per week, 3 credits.

48.231 The Sociology of the Family

A study of the nature of the family in contemporary society with particular emphasis on the family in America. What functions does the family perform in modern society? How is it changing? How do these changes affect our lives? One session per week, 3 credits.

48.232 Sociology of Ideas and Values

This course is geared to the student with little or no background in sociology or philosophy and seeks to clarify what we mean by values, ideas and concepts. The course investigates the social processes that affect the way we perceive and think about objects, social events, and interpersonal relations. The source of "correct" ideas is investigated. Ideology and culture are studied closely. Science and technology are analyzed as social processes. The question of values is brought up in relation to technology, the

quality of life, and our relationship to nature. One session per week, 3 credits.

48.293 Futuristics IA: The Study of Alternative Futures

An overview of today's futuristics and the futurists; featuring the kinds of driving ideas, personalities, envisioned worlds, concepts of the future, and specific forecasts that make the whole business tick. This course is directed to those who wish to engage in choosing preferred options that will benefit life. One session per week, 3 credits.

48.294 Futuristics IB: Alternative Futures and the Dominant Social Paradigm

A seminar enhancing our awareness of how much we really do control future events. In order to shape a preferred future, we need to hold in our minds an image of what it is we really want. This is now in the domain of every thoughtful person. Many paradigms are examined under the categories of Promethean, Sisphyean, and Protean futurists, and each student clarifies his individual world view. One session per week, 3 credits.

48.295 Futuristics IIA: Trend and Crisis Monitoring

A detailed study of 16 trends which could have an impact on our future: 4 "driving" trends - energy, climate, food, and social values; 12 "selected" trends - ecology, economics, education, politics, technology, etc. Using 10 "skeletal" scenarios written around these trends, the class fleshes out a final 10 scenarios with view and visions from futures literature. These 10 are further modified by monitoring 7 crisis levels and 4 world order values into a coherent package for each student of most likely and more preferred futures which could be sought. One session per week, 3 credits.

48.296 Futuristics IIB: Trend and Crisis Monitoring

A continuation of 48.295, since the new age is

characterized by rapid change, but is not a prerequisite. The focus or discussion is the "The Baseline Surprise Free Scenario." One session per week, 3 credits.

48.298 Futuristics IIIA: Towards the Mature Society

A seminar that speaks to a new politics of improved citizen-government interaction - the ideas and energies from "fringe" movements (feminist, ecological, spiritual, human potential, etc.) generate new politics to represent the best of this country. One session per week, 3 credits.

48.299 Futuristics IIIB: Towards Spaceship Earth

Seminar on world order which seeks to inform, educate and stimulate a world-wide social movement dedicated to transform the present international system of competing sovereign states to a just world order, having the capacity of providing peace, social justice, economic well-being, and ecological well-being throughout the globe. One session per week, 3 credits.

48.334 The Study of Minorities

This course examines the process of immigration and majority-minority relations in the U.S. over the last century with particular emphasis on the process of adaptation in a pluralistic society. One session per week, 3 credits. Prerequisite: 48.101.

48.341 Social Stratification

This course focuses on the phenomenon of social class distinctions with particular emphasis on social class in America. The approach taken is both historical and sociological. One session per week, 3 credits. Prerequisite: 48.101.

48.345 Urban Sociology

This course deals with issues related to the quality of life in American cities. Students taking this course

may engage in research projects on the city of Lowell and the role of the University of Lowell within that city. One session per week, 3 credits.

48.351 The Sociology of Health and Health Care

A historical and contemporary study of the sociopolitics of health, illness, and the health care industry in the United States. Attention is given to providers, consumers, owners, workers, and professionals in terms of their power, class, race, sex, and age. Reforms and alternatives are considered. One session per week, 3 credits. Prerequisite: 48.101.

48.356 Political Sociology

This course focuses on the development and use of power in modern society. Emphasis is placed on the relationship of American political institutions to economic institutions, to social class, and to supporting ideologies. One session per week, 3 credits. Prerequisite: 48.101.

48.478 Social Ecology

This course is aimed at the student who is seriously concerned with the current energy crisis and rising fuel costs. Ways and means to reduce home energy bills will be explored. Alternative and appropriate technologies for energy production and distribution are investigated. The course will look at the various groups in several communities that are directly involved in seeking new and more efficient, as well as more democratic and ecologically sound, ways to produce, distribute and apply energy, cut down fuel use, and develop renewable energy sources. There will be field trips to houses in nearby areas that have been energy-audited, weatherized, and retrofitted with solar devices. One session per week, 3 credits.

88.110 Man and His Environment

An inter-disciplinary study of the technological, scientific, psychological, economic and sociological response of man to his environment. Case studies include world, regional and local issues and problems. One session per week, 3 credits.

Area II: Fine Arts and the Humanities

42.101 College Writing

This course will be concerned with the preparation of expository and argumentative essays and with the critical reading of non-fiction; it will include a study of the techniques and documentation of research. One session per week, 3 credits.

42.102 College Writing & Literature

This course will be concerned with written and classroom work that reinforces the substance of 42.101. Imaginative literature representative of the major types will be studied as a basis for further developing competence in writing. One session per week, 3 credits.

NOTE: Before enrolling in any English course numbered 42.224 or higher, students must complete 42.101, 42.102 to fulfill the University requirement of 6 hours in composition.

42.224 Business Writing

A study of the theory and practice of letters, memoranda, and reports on specific business and technical problems. Registration preference for students enrolled in Business and Management programs. One session per week, 3 credits.

42.225 Technical & Scientific Writing

A study of theory and practice of letters, memoranda, and reports on specific scientific and technical problems. Registration preference for students enrolled in the Engineering Technology and Science programs. One session per week, 3 credits.

42.201 Great Books of Antiquity

Representative literary selections from the Bible, classical Greece and imperial Rome are studied as embodiments of ancient views of life and reality. One session per week, 3 credits.

42.203 Great Books of the Modern Period

Representative literary selections from the period of the Enlightenment to the present are studied as embodiments of modern views of life and reality. One session per week, 3 credits.

42.212 The Short Story

A study of the development of the genre. One session per week, 3 credits.

42.215 The Short Novel

A study of the development of the short novel as a literary genre. Themes and techniques in selected short novels by writers of the nineteenth and twentieth centuries will be studied. One session per week, 3 credits. Prerequisites: 42.101, 42.102.

42.217 The Horror Story

A study of the genre from Poe to the present. One session per week, 3 credits.

42.230 Elements of Film

A study of the elements of film as revealed in selected film classics with emphasis on analysis and evaluation. One session per week, 3 credits.

42.231 Literature and the Mass Media I

A study of radio, journalism and early cinema, and their influence on contemporary literature. One session per week, 3 credits.

42.240 Literature and Women

A survey of literary attitudes towards women from the Judaic and Hellenic periods through the contemporary. One session per week, 3 credits.

42.242 The Heroine in Modern Fiction

A study of selected short stories and novels which deal sympathetically with the changing roles of women. One session per week, 3 credits.

42.245 The Businessman in American Fiction

A study of the businessman as hero in American fiction. One session per week, 3 credits.

42.246 The Rogue in Fiction

A study of the picaresque hero depicted by such writers as Cervantes, Defoe, Fielding, Cary, Don-leavy, and Bellow, including attention to theories of comedy. One session per week, 3 credits.

42.250 The Bible as Literature

A literary and historical analysis of selected Old and New Testament books. One session per week, 3 credits.

42.252 The Literature of Hunting

A study of fictive, technical and philosophical works about hunting and fishing by such writers as Walton, Ortegay, Gasset, Grey, Hemingway, Faulkner, Bourjaily, and Woolner. One session per week, 3 credits.

42.253 The Literature of Sport

A study of the athlete as hero in selected novels, biographies and autobiographies. One session per week, 3 credits.

42.257 The Family in Literature

A study of literary selections dealing with traditions of family life and social change. One session per week, 3 credits.

42.267 Introduction to Shakespeare

A study of selected histories, comedies, and tragedies. One session per week, 3 credits.

42.291 History of English Literature I

A study of the historical development of English literature from the beginnings to Milton. Selected

works by representative authors from each period are studied. One session per week, 3 credits.

42.292 History of English Literature II

A study of the historical development of English literature from Dryden to the beginning of the twentieth century. One session per week, 3 credits.

42.294 History of American Literature I

A study of the historical development of American literature from the Colonial period to the Civil War. Selected works by representative authors from each period are studied. One session per week, 3 credits.

42.295 History of American Literature II

A study of the historical development of American literature from the Civil War to World War I. One session per week, 3 credits.

42.316 History of American Literature III

A study of twentieth century American short stories, novels, poetry and drama. One session per week, 3 credits.

42.317 British Literature of the Twentieth Century

A study of British short stories, novels, poetry, and drama. One session per week, 3 credits.

42.362 Modern Drama

A study of selected continental, British, and American plays of the late nineteenth century to the present. One session per week, 3 credits.

45.201 Introduction to Philosophy

An examination of some of the typical approaches to philosophical questioning and the issues raised in such inquiry: what is true knowledge, what is reality, what is the good, what is the right political order, what is the nature of religious faith? One session per

week, 3 credits.

45.202 Introduction to Logic

A course designed to study the methods used to distinguish correct from incorrect reasoning. It will aim at developing (1) an ability to express one's ideas clearly and concisely, (2) an increased skill in defining one's terms, and (3) a capacity to formulate arguments vigorously and to scrutinize them critically. One session per week, 3 credits.

45.203 Introduction to Ethics

An examination of the basic issues and problems of ethics and value and a survey of some important alternative answers to the questions raised, on both an individual and a social level, by our necessity to act and to live in a rational and human way. One session per week, 3 credits.

50.101 Beginning French I*

Development of fundamental skills in oral expression, aural comprehension, reading and writing. Tapes available for laboratory use. Students who have completed more than one year of French at the secondary level are ineligible for this course. One session per week, 3 credits.

50.102 Beginning French II*

A continuation of 50.101, which is a prerequisite. One session per week, 3 credits.

50.211 Intermediate Conversational French I*

Review of basic grammatical structures and idiomatic patterns with emphasis upon increased proficiency in oral expression and aural comprehension. This course is intended for students who have completed two years of high school French, preferably during their junior and senior years, for students who have completed 50.102. One session per week, 3 credits.

50.212 Intermediate Conversational French II*

A continuation of 50.211, which is a prerequisite, with emphasis upon continued development of comprehension and conversational skills. One session per week, 3 credits.

51.101 Beginning German I*

Development of fundamental skills in oral expression, aural comprehension, reading, and writing. Tapes available for laboratory use. Students who have completed more than 1 year of German at the secondary level are ineligible for this course. One session per week, 3 credits.

51.102 Beginning German II*

A continuation of 51.101, which is a prerequisite. One session per week, 3 credits.

54.101 Beginning Spanish I*

Development of fundamental skills in oral expression, aural comprehension, reading, and writing. Tapes are available for laboratory use. Students who have completed more than one year of Spanish at the secondary level are ineligible for this course. One session per week, 3 credits.

54.102 Beginning Spanish II*

A continuation of 54.101, which is a prerequisite. One session per week, 3 credits.

54.211 Intermediate Conversational Spanish I*

A review of Spanish grammar and syntax with emphasis upon increased proficiency in aural comprehension and oral expression. This course is intended for students who have completed two years of high school Spanish, preferably during their junior and senior years, for students who completed 54.102. One session per week, 3 credits.

54.212 Intermediate Conversational Spanish II*

A continuation of 54.211, which is a prerequisite, with emphasis upon continued development of comprehension and conversational skills. One session per week, 3 credits.

54.245 Advanced Spanish Conversation

Advanced oral fluency in rapid and idiomatic speech. Topics of contemporary significance will be selected from contemporary prose. One session per week, 3 credits.

54.254 Topics in Conversational Spanish

Discussion of a wide spectrum of contemporary topics with the object of continuing to develop facility and accuracy of expression. Prerequisite: advanced level proficiency. One session per week, 3 credits.

*Beginning and intermediate language courses at the 101-102 and 211-212 levels must be elected for two consecutive semesters and in the prescribed sequence. College credit may not be granted for one semester of such courses unless exception is permitted by the Chairperson of the Department of Languages on the basis of student placement in a more advanced language course.

57.255 Drawing I Studio

A foundation course in basic concepts and techniques using a variety of drawing media. The emphasis is on realism and its application to the realm of ideas. A wide range of assignments are given to develop graphic expression. One session per week, 3 credits.

57.271 Painting I Studio

Oil painting techniques are taught as vehicles for serious creative expression. A variety of assignments will be given to help the student gain proficiency in the use of color technique and subject matter. One session per week, 3 credits.

57.355 Drawing II Studio

An advanced course in drawing and an outgrowth of 57.255. The course includes a wide range of media and subject matter. Emphasis is on development of personal expression, style and the understanding of non-objective concepts. One session per week, 3 credits. Prerequisite: 57.255.

57.371 Painting II Studio

This course is designed to allow students to develop individual style through a variety of problems, both self initiated and assigned by the instructor. One session per week, 3 credits. Prerequisite: 57.271.

58.101 Appreciation of the Visual Arts

An analysis of the visual elements used in art such as color, line, and shape. Emphasis is placed on modes of representation, styles, media, technical procedures, and principles of design. One session per week, 3 credits.

58.203 Survey of Art I

A survey of the major Western arts from earliest time to the Middle Ages presented chronologically. Emphasis is placed upon the changing nature of the style and content within sequential cultural contexts. The aim of the course is to introduce the student to basic critical and art historical methods. One session per week, 3 credits.

58.204 Survey of Art: Renaissance to Modern

A survey of the major Western arts from Renaissance to the 20th century presented chronologically. Emphasis is placed upon the changing nature of the style and content within sequential cultural contexts. The aim of the course is to introduce the student to basic critical and art historical methods. One session per week, 3 credits.

Senior Lecturers

David Ainsworth, B.E.: Mechanical Engineering Technology
Nashua Senior High School

Robert Angus, B.S.E.E., M.S., P.E.: Electronic Engineering Technology
Principal & Engineering Consultant of Angus Assoc., President of Bowen's Publishing & Electronics

Walter Armstrong, A.B.A.: Banking
Senior Vice President, First Bank, Chelmsford, Massachusetts

Louis Ashley, B.A., M.Ed.: Mathematics
Senior Staff Consultant Arthur D. Little, Inc., Cambridge, Massachusetts

Edward Baldyga, M.A., B.A.: Mathematics
Assistant Professor, University of Lowell

William Bannister, B.S., Ph.D.: Chemistry
Professor, University of Lowell

Luther Barcus, B.A., M.S.: Mathematics
Associate Professor, University of Lowell

Arthur Bellemore, B.S.E.E., M.S.E.E.: Electronic Engineering Technology
Principal Engineer, Wang Laboratories

Donald Berry, M.A., B.A.: English
Associate Professor, University of Lowell

George Biernson, B.S.E.E., M.S.: Electronic Engineering Technology
Engineering Specialist, GTE Sylvania, Needham, Massachusetts

Frederick Bischoff, B.S., M.S., P.E.: Mechanical Engineering Technology
Professor, University of Lowell

Stephen Bodor, B.S., M.S.: Mathematics
Professor, University of Lowell

Stanley Bogdon, B.S.: Criminal Justice
Senior Criminalist, Boston Police Department

Howard Broad, B.S., M.B.A., P.E.: Computer Science
Senior Management Systems Engineer, Stone & Webster, Inc.

William Burke, B.A., M.Ed., J.D.: Accounting
Professor, University of Lowell

Albert Cederlund, A.B., M.S., Ph.D.: Economics
Associate Professor, University of Lowell

George Cheney, B.S.E.E., M.S.E.E.: Electronic Engineering Technology
Assistant Professor, University of Lowell

Samuel Chesler, B.S., M.B.A.: Accounting
Assistant Professor, University of Lowell

Walter Cinsavich, B.S., M.B.A.: Computer Science
Senior Systems Consultant, Wang Laboratories, Inc.

Donn Clark, B.S.E.E., M.S.E.E., P.E.: Electronic Engineering Technology
Associate Professor, University of Lowell

Pasquale Condo, B.S., M.S.: Mathematics
Associate Professor, University of Lowell

William Coughlin, B.S., A.M., Ed.D.: English
Assistant Professor, University of Lowell

Christos Dabekis, B.S.: Computer Science
Senior Systems Development Manager, Honeywell

Paul Damour, B.A., Ph.D.: Chemistry
Associate Professor, St. Anselm College, Manchester, New Hampshire

Richard Dee, B.S. in B.A.: Management
Compensation Supervisor, Wang Laboratories, Inc., Lowell, Massachusetts

Christos Demetriou, B.S.E., M.Ed.: Mechanical Engineering Technology
Industrial Arts Teacher, Lowell High School, Lowell, Massachusetts

Stephen Burke Driscoll, B.S., M.S.: Plastics
Associate Professor, University of Lowell

Frank Fiorentino, B.S. in B.A.: Accounting
President, Mahoney, Fiorentino & Company, Certified Public Accountants

James Fisk, B.S.E.E., M.S.: Electronic Engineering Technology
Professor of Engineering Technology, Northern Essex Community College

William Fitzgerald, B.S. in B.A.: Accounting
Internal Revenue Service, retired

Richard Forster, B.A., M.A.: English
Assistant Professor, University of Lowell

Joseph Franciose, B.S.: Mechanical Engineering Technology
Engineer, General Electric Company, Lynn Massachusetts

Peter Gabriel, B.S., M.Ed., M.S.: Chemistry
Science Chairperson, Grades 6-12, Billerica Public Schools

F. Raymond Hardy, B.S., M.S.: Physics
Assistant Dean, College of Science, University of Lowell

William Harrison, A.B.: Sociology
Assistant Professor, University of Lowell

William Hersey, B.A., M.A.: English
Assistant Professor, University of Lowell

Paul Hussey, B.B.A., M.Ed., M.B.A.: Accounting
Assistant Professor, Salem State College, Salem, Massachusetts

Stanley C. Israel, B.S., Ph.D.: Chemistry
Professor, University of Lowell

Alan Kaplan, B.S., M.S., Ph.D.: Mathematics
Assistant Professor, University of Lowell

Russell Karl, B.S., M.S., J.D.: Accounting
Associate Professor, University of Lowell

Raymond Kasevich, B.S.E.E., M.S.E.E., P.E.: Electronic Engineering Technology
Principal Scientist, Raytheon Company, Sudbury, Massachusetts

Mitchell Keamy, B.S.: Mechanical Engineering Technology
Instructor/Department Chairman, Drafting, Greater Lawrence Regional Technical High School,
Andover, Massachusetts

Robert Kelly, B.S.M.E.: Mechanical Engineering Technology
Professor, Wentworth Institute, Boston, Massachusetts

Joseph Kennedy, B.S. in B.A., M.Ed., M.B.A.: Accounting
Self employed

Albert Kowalak, B.S., M.S., Ph.D.: Chemistry
Associate Professor, University of Lowell

Philip Lamprey, B.S., Ph.D.: Chemistry
Professor, University of Lowell

William Mahoney, B.S.: Mechanical Engineering Technology
Program Manager, Raytheon Company, West Andover, Massachusetts

Thomas Marcella, B.S., M.S., Ph.D.: Mathematics/Physics
Associate Professor, University of Lowell

Donald Medeiros, B.S.E.T., M.S.: Civil Engineering Technology
Supervising Civil Engineer, Massachusetts Department of Public Works

Leonard Meuse, A.S.M.E., B.S., M.B.A.: English
Communications Services Manager, Polaroid Corporation

William Moloney, B.S., M.S.: Computer Science
Associate Professor, University of Lowell

John Moran, B.S., M.B.A., M.S., Ph.D.: Mathematics
Internal Consultant, Polaroid Corporation

Eugene Niemi, Jr., B.S., M.S., Ph.D.: Mechanical Engineering Technology
Associate Professor, University of Lowell

Robert O'Neil, B.S.E.E., M.S.E.E.: Electronic Engineering Technology
President, O & A Engineering, Inc.

Alexander Olsen, B.S., M.S., Ph.D.: Mathematics
Associate Professor, University of Lowell

Richard Olson, B.S.M.E., M.B.A.: Management
Management Consultant

Stephen Orroth, B.S., M.S.: Plastics
Associate Professor, University of Lowell

Cyril Pipan, A.S.E.E., B.S., M.B.A.: Mathematics
Vice President/Director of Marketing, Space Optics Research Laboratories

Donald Pottle, B.S., M.A.: Industrial Technology/Civil Engineering Technology
Adjunct Professor, University of Lowell

John Sewell, B.S., P.E.: Civil Engineering Technology
Associate Professor, University of Lowell

Richard Shifman, B.S.E.E., M.S.M.A., P.E.: Computer Science
President, Data Systems, Inc., Newton, Massachusetts

Paul Snoonian, B.S., M.B.A., M.A., Ph.D.: Economics
Associate Professor, University of Lowell

Paul Surpernant, B.S.: Banking
Senior Vice President & Treasurer, First Bank, Chelmsford, Massachusetts

Arthur Talkington, M.A.: Mathematics
Associate Professor, University of Lowell

Theodore Tasis, B.S., M.A.: English
Program Management, Raytheon Corporation, Wayland, Massachusetts

Virginia Taylor, B.S., M.A., Ph.D.: Mathematics
Professor, University of Lowell

Philip Tays, B.S.E.E., M.S.E.E.: Electronic Engineering Technology
Group Manager, Digital Equipment Corporation

Charles Thompson, M.B.A., B.S.A.: Accounting
Assistant Professor, University of Lowell

Anthony Turrisi, B.S., M.A.: English
Assistant Professor, University of Lowell

Louis Visco, B.S., M.S.: English
Chief Editor, Arthur D. Little, Inc.

David Wade, B.S.E.E., M.S.E.E.: Electronic Engineering Technology
Associate Professor, University of Lowell

Joseph Waterman, B.S., M.B.A., P.Ed.: Psychology
Associate Professor, University of Lowell

Eugene Welch, Jr., B.S., M.Ed.: Mathematics
Mathematics & Science Teacher, City of Lowell, Moody Junior High

Ned Wheeler, B.S.E.E., M.S.E.E.: Electronic Engineering Technology
Engineer, AFGL, Hanscom Air Force Base, Bedford, Massachusetts

P.G. Zicari, B.A., M.S.: Management
Manager, Employee & Community Relations, General Electric Company

Directions to University of Lowell

The three main approaches to the Lowell area are:
I-93, I-495 and U.S. 3.

To the Lowell area we recommend:

From Boston & South Shore - I-93 North

From New Hampshire and Vermont - I-93 South

From Southwestern New Hampshire -

U.S. 3 South

From Southeastern Massachusetts and Rhode Island - U.S. 3 North

From Eastern New Hampshire, Maine, and Northeastern Massachusetts - I-95 South to I-495 South to I-93 North

From Worcester, Connecticut, and points West - I-90 (Mass. Pike) East to exit 10 (Auburn), I-290 North to terminus at I-495 North.

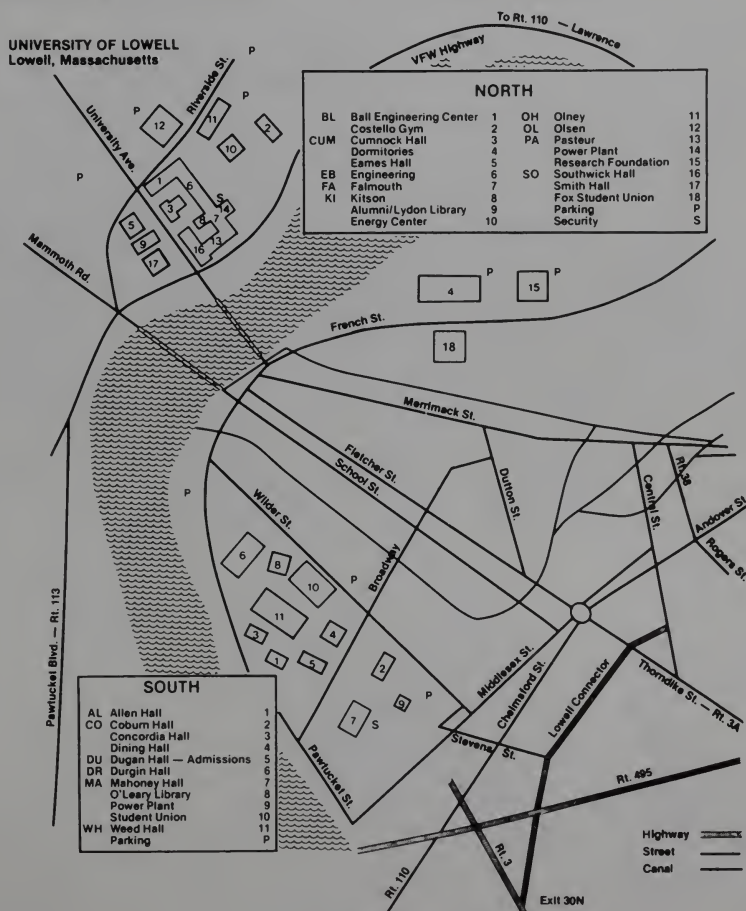
To University of Lowell North Campus we recommend:

From I-93 - take exit 20 (Rtes. 110 & 113) pick up Rte. 110 West off rotary. Follow highway along north bank of the Merrimack River, 8 miles to the North Campus.

From I-495 South - pick up I-93 North in Andover, to exit 20. Proceed as above.

From U.S. 3 North and I-495 North - take the Lowell Connector to exit 5 (Thorndike Street). Follow to end and turn right, First left across bridge onto North Campus.

From U.S. 3 South - take exit 35, Rte. 113 East across Merrimack River, Rte 113 continues at first right immediately after bridge. Follow 5 miles to North Campus.



CLASS SESSION CALENDAR

1983 - 1984

FALL TERM

	Mon.	Tues.	Wed.	Thurs.	Fri.
August	29	30 —Registration—	31	1	
September		6	7	8	
	12	13	14	15	
	19	20	21	22	
	26	27	28	29	
October	3	4	5	6	7 Mon. Class
		11	12	13	
	17	18	19	20	
	24	25	26	27	
Last week to withdraw					
November	31	1	2	3	
	7	8	9	10	
	14	15	16	17	18 Make Up
	21	22 Th. Class	23		
December	28	29	30	1	2 Make Up
	5	6	7	8	9 Make Up
	12	13	14	15	
	19	20	— Exams —		
	Exams				

SPRING TERM

	Mon.	Tues.	Wed.	Thurs.	Fri.
January	9	10 —Registration—	11	12	
		17	18	19	
	23	24	25	26	
	30	31	1	2	
February	6	7	8	9	
	13	14	15	16	17 Mon. Class
		21	22	23	
	27	28	29	1	
March	5	6	7	8	
	Last week to withdraw				
	12	13	14	15	
	19	20	21	22	23 Make Up
April	26	27	28	29	30 Make Up
	2	3	4	5	6 Make Up
	9	10	11	12	13 Mon. Class
		17	18	19	
May	23	24	25	26	
	— Exams —				
	30	1	2	3	
	Exams	Summer Registration			

University of Lowell
Continuing Education
Cunnock Hall
Lowell, MA 01854

Third Class Mail

'83 -
'84

UNIVERSITY OF LOWELL CONTINUING EDUCATION

Bulletin of Undergraduate Studies